Governorates' Examinations on Algebra and Probability

1 Cairo Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 The probability of the impossible event equals ....

(a) zero. (b) $\frac{1}{2}$ (c) 1 (d) $\varnothing$

2 The value of x which satisfies the equation $x^2 = 9$ where $x \in \mathbb{N}$ is ....

(a) -3 (b) 3 (c) $\sqrt{3}$ (d) ± 3

3 The curve of the function $f : f(x) = a x^2 + b x + c$ cuts the y-axis at the point .... where $a \neq 0$

(a) $(0, a)$ (b) $(0, b)$ (c) (c, a) (d) $(0, c)$

4 The double of the number $\frac{1}{2}$ is ....

(a) $\frac{1}{4}$ (b) 1 (c) 2 (d) 4

5 The domain of the function $n : n(x) = \frac{x+1}{x-4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-1\}$ (c) $\mathbb{R} - \{4\}$ (d) $\mathbb{R} - \{-1, 4\}$

6 $a^m \times a^n = a^{\cdots\cdots}$ where $a \neq 0$ and $m \in \mathbb{Z}_+$, $n \in \mathbb{Z}_+$

(a) $m + n$ (b) $m - n$ (c) mn (d) $\frac{m}{n}$

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2 [a] Using the general formula , find in $\mathbb{R}$ the solution set for the equation :

$x^2 - 3x + 1 = 0$ (approximating the result to the nearest one decimal place).

[b] Find n (x) in its simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^3 + 8} \times \frac{x^2 - 2x + 4}{x}$$

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3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x = 5$ and $x^2 + y^2 = 29$

[b] Find n (x) in its simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 - 1}{x^3 - 1} - \frac{1}{x^2 + x + 1}$$

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $2x + y = 3$, $3x - y = 7$

[b] **Find n (x) in its simplest form , showing the domain of n where :**

$n(x) = \frac{x-1}{x^2 - 4x + 3} + \frac{x+3}{x^2 - 9}$, then find n (1) if possible.

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5 [a] If A and B are two mutually exclusive events of a random experiment and :

$P(\grave{A}) = 0.5$, $P(A \cup B) = 0.8$, **find (showing steps) :**

1. $P(A \cap B)$
2. $P(A)$
3. $P(B)$

[b] If $n(x) = \frac{x^2 + 7x + 10}{3x + 15}$ **, find :**

1. The domain of n^{-1}
2. $n^{-1}(x)$ in its simplest form.

2 Giza Governorate

Answer the following questions :

1 **Choose the correct answer :**

1. If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 7 (b) 6 (c) 5 (d) 14

2. The domain of the function $f : f(x) = \frac{x}{x-1}$ is ....

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

3. If $a b = 3$, $a b^2 = 12$, then b = ...

(a) 4 (b) 2 (c) -2 (d) ± 4

4. If $A \subset S$ of a random experiment , $P(\grave{A}) = 2 P(A)$, then P (A) = ...

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

5. The additive inverse of the number $\left(1 - \sqrt{2}\right)$ is ....

(a) $1 + \sqrt{2}$ (b) $-1 - \sqrt{2}$ (c) $\sqrt{2} - 1$ (d) $\sqrt{2}$

6. The two straight lines $3x + 5y = 0$ and $5x - 3y = 0$ are intersecting on the ....

(a) first quadrant. (b) second quadrant.

(c) origin point. (d) third quadrant.

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2 [a] If A and B are two events of a random experiment , $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$ **, find :** 1. $P(A \cup B)$ 2. $P(A - B)$

[b] **Solve the following two equations in $\mathbb{R} \times \mathbb{R}$:** $2x - y = 3$, $x + 2y = 4$

3 [a] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$

, find : 1 $n^{-1}(X)$ in the simplest form and find the domain of n^{-1}

2 The value of X if $n^{-1}(X) = 3$

[b] **Find n (X) in the simplest form and find the domain of n if :** $n(X) = \frac{X^2 + 2X}{X^2 - 9} \div \frac{2X}{X + 3}$

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4 [a] **Find n (X) in the simplest form and find the domain of n if :**

$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} + \frac{X^2 - 9}{X^2 + X - 6}$

[b] **Find in $\mathbb{R}$ the S.S. of the equation :** $3X^2 - 5X + 1 = 0$ by using the general formula approximating the result to the nearest two decimal places.

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5 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**

$X + y = 5$, $X^2 + y^2 = 13$

[b] If $n_1(X) = \frac{2X}{2X + 8}$, $n_2(X) = \frac{X^2 + 4X}{X^2 + 8X + 16}$ **, prove that :** $n_1 = n_2$

3 Alexandria Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer from those given :**

1 The two straight lines $2X + y = 0$, $X - 2y = 3$ are intersecting in the ....

(a) origin point. (b) first quadrant. (c) second quadrant. (d) fourth quadrant.

2 If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) zero (c) 1 (d) 2

3 The set of zeroes of the function $f : f(X) = X^2 - 16$ is ....

(a) $\{-4\}$ (b) $\{4\}$ (c) $\{4, -4\}$ (d) $\varnothing$

4 If $a^2 - b^2 = 7$, $a - b = 1$, then $a + b =$ ....

(a) 6 (b) 4 (c) 3 (d) 7

5 If $X^2 = 25$, then $X =$ ....

(a) 5 (b) -5 (c) ± 5 (d) 12.5

6 If $a\,b = 3$, $a\,b^2 = 12$, then $b =$ ....

(a) 4 (b) 2 (c) -2 (d) ± 2

2 **[a] Find the solution set of the following equations algebraically in $\mathbb{R} \times \mathbb{R}$:**

$2x - y = 3 \quad , \quad x + 2y = 4$

[b] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :

$2x^2 - 4x + 1 = 0$ approximating the result to the nearest one decimal.

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3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 1 \quad , \quad x^2 + y^2 = 25$

[b] Find n (x) in the simplest form , showing the domain of n

where : $n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x - 3}{x^2 - 5x + 6}$

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4 **[a] Simplify :** $n(x) = \frac{x^3 - 1}{x^2 - x} \times \frac{x + 3}{x^2 + x + 1}$, showing the domain.

[b] If $n_1(x) = \frac{2x}{2x + 8} \quad , \quad n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

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5 **[a]** If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$ **, find :** $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

[b] If A and B are two events of the sample space of a random experiment , $P(A) = 0.3 \quad , \quad P(B) = 0.6 \quad , \quad P(A \cap B) = 0.2$

, find : **1** $P(A \cup B)$ **2** $P(A - B)$

4 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer from the given answers :**

1 The set of zeroes of the function f where $f(x) = x^2 + 1$ in $\mathbb{R}$ is ....

(a) $\{-1\}$ (b) $\{1 , -1\}$ (c) $\{\text{zero}\}$ (d) $\varnothing$

2 If $A \subset S$ of a random experiment , $P(A) = \frac{1}{3}$, then $P(\grave{A}) =$ ....

(a) $\frac{-1}{3}$ (b) zero. (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

3 The two straight lines $x - 3 = 0 \quad , \quad y = 4$ are intersecting in the ....

(a) first quadrant. (b) second quadrant.

(c) third quadrant. (d) origin point.

4 If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ....

(a) zero. (b) 1 (c) 0.5 (d) $\varnothing$

5 If $x \neq$ zero , then $\frac{3x}{x^2+5} \div \frac{x}{x^2+5} =$ ....

(a) -3 (b) -1 (c) 1 (d) 3

6 The domain of the function n : $n(x) = \frac{x-1}{x}$ is ....

(a) $\{0\}$ (b) $\{1\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{1\}$

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2 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $x^2 - x - 4 = 0$ by using the general formula rounding the results to two decimals.

[b] **Simplify :** $f(x) = \frac{3x-15}{x+3} \times \frac{4x+12}{5x-25}$, showing the domain of f

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3 [a] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3+x^2+x}{x^4-x}$ **, then prove that :** $n_1 = n_2$

[b] **Solve in $\mathbb{R} \times \mathbb{R}$:** $2x - y = 4$, $x + y = 5$

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4 [a] **Simplify :** $f(x) = \frac{x^2+x+1}{x^3-1} - \frac{x^2+x}{x^2-1}$, showing the domain of f

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 1$, $x^2 + y^2 = 25$

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5 [a] If A and B are two events of a random experiment and P (A) = 0.2 , P (B) = 0.5 , P (A ∩ B) = 0.1 **, find :** 1 P (A ∪ B) 2 P (A − B)

[b] A rectangle is with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm. , find the area of the rectangle.

5 El-Sharkia Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 If the two equations : $2x + y = 5$, $4x + 2y = a$ have an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$, then a = ...

(a) 1 (b) 5 (c) 10 (d) 15

2 Quarter of the number 2^{12} is ....

(a) 2^{10} (b) 2^{11} (c) 2^5 (d) 2^3

3 If $f(x) = \frac{x+3}{x-2}$, then the domain of the additive inverse of the function is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{2, -3\}$ (c) $\mathbb{R} - \{-3\}$ (d) $\mathbb{R}$

4 If $x^2 - 4xy + 4y^2 =$ zero , then $x - 2y + 7 =$ ....

(a) 2 (b) 7 (c) 10 (d) 15

5 If a b = 5 and a $b^2 = 20$, then b^{-1} = ...

(a) 100 (b) 25 (c) 4 (d) $\frac{1}{4}$

6 If A and B are two events of a random experiment , $A \subset B$, then $P(A \cup B)$ = ...

(a) zero. (b) P (B) (c) P (A) (d) $P(A \cap B)$

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2 [a] **Find the S.S. in $\mathbb{R} \times \mathbb{R}$ of the two equations :** $x + y = 4$, $3x + 2y = 14$

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^3 - 1}{x^2 - 1} \div \frac{x^2 + x + 1}{x + 3}$, then find n (– 3)

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3 [a] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :**

$x^2 - 2x - 4 = 0$ approximating the result to the nearest two decimal places.

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^2 + 3x}{x^2 + 2x - 3} + \frac{x - 2}{x^2 - 3x + 2}$

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4 [a] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$, **prove that :** $n_1 = n_2$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $y - x = 2$, $x^2 + xy - 12 = 0$

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5 [a] If the domain of the function $f : f(x) = \frac{x + 2}{x^2 - a}$ is $\mathbb{R} - \{-2 , 2\}$

, find the value of a , then find $f(3)$

[b] If A and B are two events from the sample space of a random experiment and

P (A) = 0.4 , P (B) = 0.5 , $P(A \cap B) = 0.2$

, find each of : 1 $P(A \cup B)$

2 The probability of non occurrence of the event B

6 El-Monofia Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer from those given :**

1 The solution set of the equation : $x^2 + 4 = 0$ in $\mathbb{R}$ is ....

(a) $\varnothing$ (b) $\{2\}$ (c) $\{-2\}$ (d) $\{2 , -2\}$

2 If $x^2 - y^2 = 5$, $x + y = 5$, then $x - y$ = ...

(a) 3 (b) 2 (c) 1 (d) zero.

3 $2^3 + 2^3 =$ ....

(a) 2^6 (b) 2^9 (c) 2^4 (d) 4^3

4 The two straight lines : $x + 2y = 1$ and $2x + 4y = 6$ are ....

(a) parallel. (b) intersecting and non perpendicular.

(c) perpendicular. (d) coincide.

5 The set of zeroes of f where $f(x) = x^2 - 5x + 6$ is ....

(a) $\{2, 3\}$ (b) $\{5, 6\}$ (c) $\mathbb{R} - \{5, 6\}$ (d) $\mathbb{R} - \{2, 3\}$

6 If $A \subset S$ of a random experiment and $P(A) = 0.4$, then $P(\acute{A}) =$ ....

(a) zero. (b) 0.5 (c) 0.6 (d) 1

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2 **[a] Find the solution set of the two equations :** $2x - y = 3$, $x + 2y = 4$ in $\mathbb{R} \times \mathbb{R}$

[b] Find n (x) in the simplest form , showing the domain where :

$$n(x) = \frac{6}{x^2 - 9} + \frac{1}{x + 3}$$

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3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$, the solution set of the following equations :**

$x - y = 0$, $2x^2 - y^2 = 4$

[b] If $n_1(x) = \dfrac{x^2}{x^3 - 3x^2}$, $n_2(x) = \dfrac{x}{x^2 - 3x}$ **, then prove that :** $n_1 = n_2$

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4 **[a] Find the solution set of the following equation in $\mathbb{R}$:** $x^2 - 6x + 4 = 0$

(By using the general formula approximating the results to two decimal places).

[b] Find n (x) in the simplest form , showing the domain where :

$$n(x) = \frac{x^3 - 1}{x - 1} \times \frac{x + 3}{x^2 + x + 1}$$

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5 **[a]** If A and B are two events from the sample space of a random experiment and

$P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$ **, then find :**

1 $P(A \cup B)$ 2 $P(A - B)$

[b] If $n(x) = \dfrac{x^2 - 2x}{x^2 - 3x + 2}$ **, then find :**

1 $n^{-1}(x)$ and identify the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 2$

7 El-Gharbia Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer from those given :**

1 The domain of $f : f(X) = \frac{X}{X-1}$ is ……………

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

2 The probability of the impossible event equals ……………

(a) -1 (b) 0 (c) $\frac{1}{2}$ (d) 1

3 If $3^X = 1$, then $X =$ ……………

(a) 1 (b) 3 (c) 0 (d) -1

4 The set of zeroes of $f : f(X) = X(X-1)$ is ……………

(a) $\{0, 1\}$ (b) $\{0, -1\}$ (c) $\{-1, 1\}$ (d) $\{1\}$

5 The number of solutions of the two equations : $X + y = 5$, $2X + 2y = 10$ simultaneously in $\mathbb{R} \times \mathbb{R}$ is ……………

(a) 0 (b) 1 (c) 2 (d) infinite

6 If $X^2 - k = (X-5)(X+5)$, then $k =$ ……………

(a) 5 (b) -5 (c) 25 (d) -25

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2 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two simultaneous equations :**

$X - y = 4$, $2X + y = 5$

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$n(X) = \frac{2X}{X+3} + \frac{6}{X+3}$

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3 [a] **Find in $\mathbb{R}$ by using the general formula , the solution set of the equation :**

$X^2 + 3X - 3 = \text{zero}$, rounding the results to two decimal places.

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$, **then prove that :** $n_1 = n_2$

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4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $X - 4 = \text{zero}$, $X^2 + y^2 = 25$

[b] If A and B are two events from the sample space of a random experiment where $P(A) = 0.3$, $P(B) = 0.6$ and $P(A \cap B) = 0.2$, **then find :** $P(A \cup B)$

5 [a] **Find n (X) in the simplest form , showing the domain :** $n(X) = \frac{X^3 - 1}{X^2 - X} \times \frac{X + 3}{X^2 + X + 1}$

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$ **, then find :** $n^{-1}(X)$ in the simplest form and identify the domain of n^{-1}

8 El-Dakahlia Governorate

Answer the following questions : ***(Calculator is permitted)***

1 [a] **Choose the correct answer :**

1. The two straight lines which represent the two equations :
$X = 3$, $y = 5$ are ....
(a) perpendicular. (b) coincide.
(c) parallel. (d) intersecting and not perpendicular.

2. The equation $\frac{1}{X} + \frac{1}{y} = 3$ is of the .... degree ($X \neq y \neq 0$)
(a) first (b) second (c) third (d) fourth

3. The number of solutions of the equation : $2X - 6 = 0$ in $\mathbb{R}^2$ is ....
(a) 1 (b) 2 (c) 3 (d) infinite.

[b] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**
$X^2 - 2X - 6 = 0$, approximating the result to the nearest two decimal places.

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2 [a] **Choose the correct answer :**

1. A number formed from two digits , its units digit = its tens digit = X
, then the number is ....
(a) X^2 (b) $2X$ (c) $11X$ (d) $10X^2$

2. If $n(X) = \frac{X - 3}{X + 2}$, $n^{-1}(k) = \frac{7}{2}$, then k = ... $X \notin \{3 , -2\}$
(a) -4 (b) 5 (c) -5 (d) $-\frac{8}{9}$

3. If A and B are two mutually exclusive events from the sample space of a random experiment , then $A \cap B$ = ...
(a) $\varnothing$ (b) S (c) zero. (d) 1

[b] **Find n (X) in the simplest form , showing the domain of n :**

$$n(X) = \frac{X^2 - 2X - 15}{X^2 - 9} \div \frac{2X - 10}{X^2 - 6X + 9}$$

3 [a] If the set of zeroes of $f : f(X) = a X^2 + b X + 15$ is $\{3 , 5\}$

, **find :** the value of each of a , b

[b] If $n_1(X) = \frac{X^2 - 4}{X^2 + X - 6}$, $n_2(X) = \frac{X^2 - X - 6}{X^2 - 9}$, show if $n_1(X) = n_2(X)$ or not.

Find the common domain in which $n_1(X) = n_2(X)$

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4 [a] **Find n (X) in the simplest form , showing the domain of n :**

$$n(X) = \frac{X^2 + 3X + 9}{X^3 - 27} + \frac{(X - 4)^2}{X^2 - 7X + 12}$$

[b] A right-angled triangle , the length of one of the right angle sides is 5 cm. , and its perimeter is 30 cm. , find its surface area.

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5 [a] If A and B are two events of the sample space of a random experiment , and P (A) = 0.6 , P (B) = 0.7 , P (A ∩ B) = 0.4 , **find :**

1 P (A – B)

2 The probability of the occurrence of one of the two events at least.

[b] If $\frac{k + 5 - X^2}{X^2 - 3X}$ is the additive inverse of the fraction $\frac{X}{X - 3}$, **find :** the value of k

9 Ismailia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 Choose the correct answer from those given :

1 The set of zeroes of the function $f : f(X) = X - 5$ is ....

(a) {5} (b) {– 5} (c) {5 , – 5} (d) {zero}

2 $\left(\sqrt[3]{9} \times \sqrt[3]{3}\right)^2 =$ ....

(a) 3 (b) 6 (c) 9 (d) 27

3 The solution set of the two equations : X = 5 , y – 2 = 0 in ℝ × ℝ is ....

(a) {(5 , – 2)} (b) {(5 , 2)} (c) {(– 5 , 2)} (d) {(– 2 , 5)}

4 If X is the additive identity , y is the multiplicative identity , then $1000^X + 99^y =$ ....

(a) 99 (b) 100 (c) 199 (d) 1000

5 If the sum of two numbers is 8 and their product is 12 , then the two numbers are ....

(a) 2 , 6 (b) 7 , 1 (c) 3 , 5 (d) 4 , 4

6 If A and B are two events from the sample space of a random experiment , A ⊂ B , then P (A ∪ B) = ...

(a) zero. (b) P (A) (c) P (B) (d) P (A ∩ B)

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations together :** $X + y = 4$, $2X - y = 2$

[b] Find n (X) in the simplest form , showing the domain of n :

$$n(X) = \frac{X - 3}{X^2 - 9} + \frac{X^2 - 2X - 8}{X^2 + 5X + 6}$$

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3 **[a] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 4X + 2 = 0$ (rounding the result to two decimal places)

[b] If $n_1(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$, $n_2(X) = \frac{2X}{2X + 4}$ **, prove that :** $n_1 = n_2$

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4 **[a] Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X - 5}{X^2 - 2X - 15} \div \frac{8}{2X + 6}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations together : $X - 3 = 0$, $X^2 + y^2 = 25$

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5 **[a] Find n (H) in the simplest form , showing the domain of n where :**

$$n(H) = \frac{H^2 - 4}{H^3 - 8} \times \frac{H^2 + 2H + 4}{H^2 - H - 6}$$

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

, find : **1** $P(A \cup B)$ **2** $P(\acute{A})$

10 Suez Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The set of zeroes of f where $f(X) = 2X$ is ....

(a) $\mathbb{R} - \{0\}$ (b) $\{2\}$ (c) $\{0\}$ (d) $\mathbb{R} - \{2\}$

2 If $X^2 + kX - 21 = (X - 3)(X + 7)$, then k = ...

(a) 4 (b) – 4 (c) 10 (d) – 10

3 The additive inverse of the fraction $\frac{2}{X + 1}$ is ....

(a) $\frac{2}{X - 1}$ (b) $\frac{-2}{X + 1}$ (c) $\frac{X + 1}{-2}$ (d) $\frac{X - 1}{2}$

4 If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B)$ = ...

(a) 0 (b) 1 (c) 0.5 (d) $\varnothing$

5 The two equations : $x = 4$, $y - 3 = 0$ are represented by two straight lines intersecting at the point ....

(a) (4 , 3) (b) (4 , – 3) (c) (3 , 4) (d) (– 3 , 4)

6 If $a^{x} = 2$, $a^{y} = 10$, then $a^{x+y} =$ ....

(a) 5 (b) 8 (c) 12 (d) 20

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2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + y = 4$, $3x - y = 8$

(Explain your answer showing the solution steps).

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x+2}{x^2-4} + \frac{x-3}{x^2-5x+6}$$

---

3 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 0$, $2x^2 - y^2 = 9$

[b] If $n_1(x) = \frac{2x}{2x+8}$, $n_2(x) = \frac{x^2+4x}{x^2+8x+16}$, **prove that :** $n_1 = n_2$

---

4 [a] **Find in $\mathbb{R}$ the solution set of the following equation :** $x^2 - 6x + 4 = 0$

(Rounding the results to two decimal places).

[b] If $n(x) = \frac{x+7}{x-2}$, **find :** $n^{-1}(x)$ and identify the domain of n^{-1}

---

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x^3-1}{x^2-2x+1} \times \frac{2x-2}{x^2+x+1}$$

[b] If A and B are two events from the sample space of a random experiment and P (A) = 0.8 , P (B) = 0.7 , $P(A \cap B) = 0.6$

, **find :** 1 $P(A \cup B)$ 2 $P(\grave{A})$

11 Port Said Governorate

Answer the following questions :

First Objective Questions

Choose the correct answer from those given :

1 The additive inverse of the fraction $\frac{3}{x+1}$ is ....

(a) $\frac{x+1}{3}$ (b) $\frac{-3}{x+1}$ (c) $\frac{3}{x-1}$ (d) $\frac{x+1}{-3}$

2 Two positive numbers , their sum is 3 and the sum of their squares is 5 , then the two numbers are ....

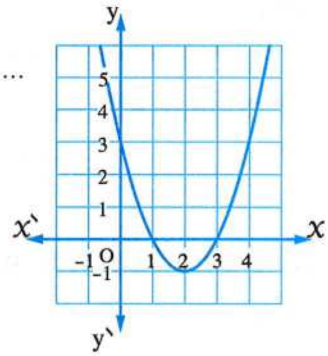
(a) 1 , 4 (b) 3 , 2 (c) 0 , 8 (d) 1 , 2

3 The common domain of the two fractions $\frac{7}{x-5}$, $\frac{8}{x-3}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{5 , 3\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{3\}$

4 **In the figure opposite :**

The solution set in $\mathbb{R}$ of the equation whose curve is shown is ....



(a) $\varnothing$

(b) $\{1 , 3\}$

(c) $\{2\}$

(d) $\{3\}$

5 The probability of the certain event equals ....

(a) 1 (b) 0.5 (c) 0.1 (d) zero.

6 The set of zeroes of the function f where $f(x) = x + 3$ is ....

(a) $\{3\}$ (b) $\mathbb{R}$ (c) $\{-3\}$ (d) $\varnothing$

7 The domain of the multiplicative inverse of the function $f : f(x) = \frac{x+2}{x-3}$ is ....

(a) $\{3\}$ (b) $\mathbb{R} - \{-2 , 3\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R}$

8 The solution set of the two equations $x = 2$ and $x\,y = 6$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 3)\}$ (b) $\{2 , 3\}$ (c) $\{(3 , 2)\}$ (d) $\{3\}$

9 The two lines $x + 2y = 1$, $2x + 4y = 6$ are ....

(a) intersecting. (b) parallel. (c) perpendicular. (d) coincide.

10 $|-3| + |3| =$ ....

(a) -6 (b) zero. (c) 6 (d) 9

11 The simplest form of the expression $\frac{2}{x-2} - \frac{x}{x-2}$ is .... where $x \neq 2$

(a) $\frac{2}{x-2}$ (b) $\frac{x}{x-2}$ (c) -1 (d) 1

12 If $A \subset S$ for any random experiment and $P(A) = \frac{1}{3}$, then $P(\acute{A}) =$ ....

(a) 1 (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) zero.

13 If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} =$ ....

(a) -5 (b) -1 (c) 1 (d) 5

14 The number of possible solutions of the two equations : $x - 2y = 3$, $3x - 6y = 9$ in $\mathbb{R} \times \mathbb{R}$ is ……………

(a) infinite. (b) three. (c) two. (d) one.

15 If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$, then $P(A \cup B) =$ ……………

(a) 2.1 (b) 1.5 (c) 0.9 (d) 0.5

16 $\sqrt{9 + 16} =$ …………… $+ 4$

(a) zero (b) 1 (c) 3 (d) 5

17 The solution set of the two equations : $x = 1$, $y = 7$ in $\mathbb{R} \times \mathbb{R}$ is ……………

(a) $\{(1, 7)\}$ (b) $\{(7, 1)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

18 The domain of the function f where $f(x) = \frac{x - 3}{4}$ is ……………

(a) $\mathbb{R} - \{4, 3\}$ (b) $\mathbb{R} - \{4\}$ (c) $\varnothing$ (d) $\mathbb{R}$

19 If A and B are two mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) =$ ……………

(a) $\varnothing$ (b) zero. (c) 0.5 (d) 1

20 The point $(2, -1)$ is an element of the line whose equation is ……………

(a) $x = 3$ (b) $y = 5$ (c) $x + y = 3$ (d) $x + y = 1$

21 The point $(-2, -3)$ lies in the …………… quadrant.

(a) first (b) second (c) third (d) fourth

Second Essay questions

22 **By using the general formula , find the solution set in $\mathbb{R}$ of the equation :** $x^2 - x - 3 = 0$ (rounding the result to the first decimal).

23 If $n(x) = \frac{x}{x+1} + \frac{1}{x+1}$, **find :** $n(x)$ in the simplest form , showing the domain of n

24 If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \times \frac{x + 3}{x}$, **find :** $n(x)$ in the simplest form , showing the domain of n

12 Damietta Governorate

Answer the following questions : *(Calculators are allowed)*

1 Choose the correct answer from those given :

1 $\mathbb{Z} - \mathbb{Z}_{-} =$ ……………

(a) $\{0\}$ (b) $\varnothing$ (c) $\mathbb{N}$ (d) $\mathbb{Z}$

2 The probability of the impossible event equals ....

(a) 0.5 (b) zero. (c) $\varnothing$ (d) 1

3 $|-3|+|3| =$ ....

(a) -6 (b) zero. (c) 6 (d) 9

4 The set of solution of the two equations : $x = 2$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 3)\}$ (b) $\{(3 , 2)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

5 If $\left(\frac{5}{3}\right)^x = \frac{9}{25}$, then $x =$ ....

(a) 3 (b) 2 (c) -3 (d) -2

6 If $n(x) = \frac{x-1}{x}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0 , 1\}$

---

2 **[a] By using the general formula , find the solution set of the following equation in $\mathbb{R}$:**

$x^2 + 3x - 3 = 0$ (approximating the result to the nearest one decimal place).

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 + 4x - 5} \times \frac{x + 5}{x^2 + x + 1}$$

---

3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x + y = 1$, $x + 2y = 5$

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x - 3}{x^2 - 9} + \frac{x^2 - 2x - 8}{x^2 + 5x + 6}$$

---

4 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x = y$, $x^2 + y^2 = 32$

[b] If the domain of the function n where $n(x) = \frac{a}{x} + \frac{9}{x - b}$ is $\mathbb{R} - \{0 , 1\}$, $n(4) = 5$

, find : the values of a and b

---

5 **[a]** If A and B are two events from the sample space of a random experiment and

$P(A) = 0.4$, $P(B) = 0.5$, $P(A \cap B) = 0.2$

, find : 1 $P(\acute{A})$ 2 $P(A \cup B)$

[b] If $n_1(x) = \frac{1}{x - 2}$, $n_2(x) = \frac{x^2 + 2x + 4}{x^3 - 8}$

, prove that : $n_1 = n_2$

13 Kafr El-Sheikh Governorate

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer from those given :

1 The set of zeroes of the function $f : f(X) = X^2 + 9$ is ....

(a) $\{3\}$ (b) $\{-9\}$ (c) $\{-3 , 3\}$ (d) $\varnothing$

2 If A and B are two events from the samble space of a random experiment , $A \subset B$, $P(A) = 0.3$, then $P(A \cap B) =$ ....

(a) 0.7 (b) 1 (c) – 0.3 (d) 0.3

3 If $a b = 3$, $a b^2 = 12$, then $b =$ ....

(a) 3 (b) 4 (c) 2 (d) 6

4 If there are an infinite number of solutions of the two equations :

$X + 4y = 7$, $3X + ky = 21$ in $\mathbb{R} \times \mathbb{R}$, then $k =$ ....

(a) 12 (b) 3 (c) 6 (d) 8

5 If $f(X) = \frac{X+2}{X-3}$, then the domain of f^{-1} is ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{-2 , 3\}$ (d) $\mathbb{R}$

6 If A is an event from the semple space of a random experiment , $P(A) = 0.5$, then $P(\grave{A}) =$ ....

(a) 0.5 (b) – 0.5 (c) 1 (d) zero.

---

2 [a] If $n(X) = \frac{X^2}{X-1} + \frac{X}{1-X}$, **find :** n (X) in the simplest form , showing the domain of n

[b] By using the general rule , find in $\mathbb{R}$ the solution set of the equation :

$2X^2 + 1 = 4X$, rounding the result to two decimals.

---

3 **[a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$y = 2X - 3$, $X + 2y = 4$

[b] If $n(X) = \frac{X^2 + 2X}{X^3 - 27} \div \frac{X + 2}{X^2 + 3X + 9}$, **find :** n (X) in the simplest form , showing the domain of n , **find if possible :** n (2) , n (– 2)

---

4 [a] If the domain of the function n : $n(X) = \frac{b}{X} - \frac{9}{X + a}$ is $\mathbb{R} - \{0 , -4\}$, $n(5) = 2$, **find :** the values of a , b

[b] If A and B are two events of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

5 [a] A bike rider moved from city A in the direction of east to city B , he moved north to city C to travel a distance of 7 km. , if the sum of the squares of the traveled distances is 25 km^2 , find the shortest distance between city A and C

[b] If $n_1(X) = \frac{X^2-4}{X^2+X-6}$, $n_2(X) = \frac{X^2-X-6}{X^2-9}$, show whether $n_1 = n_2$ or not , and why.

14 El-Beheira Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **Choose the correct answer from the given ones :**

1. $3^2 + 3^2 + 3^2 =$ ....

(a) 3^6 (b) 3^9 (c) 3^3 (d) 9^6

2. The number of solutions of the two equations : $X + y = 2$, $y + X = 1$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero. (b) 1
(c) 2 (d) an infinite number of solutions.

3. The set of zeroes of the function f where $f(X) = X^3 - 9X$ is ....

(a) $\{0 , 3\}$ (b) $\{0 , -3 , 3\}$ (c) $\{-3 , 3\}$ (d) $\varnothing$

4. If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ....

(a) 1 (b) $\varnothing$ (c) 0.5 (d) zero.

5. If $(X + 2)^{zero} = 1$, then $X \in$ ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R}$

6. If $4X - 5y =$ zero , then $\frac{X}{y} =$ ....

(a) $\frac{4}{5}$ (b) $\frac{-4}{5}$ (c) $\frac{5}{4}$ (d) $\frac{-5}{4}$

---

2 [a] **Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$ algebraically :**

$2X + y = 5$, $2X - y = 3$

[b] **Find n (X) in the simplest form , showing the domain :**

$$n(X) = \frac{X^2 + 2X}{X^2 - 4} + \frac{X - 3}{X^2 - 5X + 6}$$

---

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 2X - 4 =$ zero (rounding the results to two decimal places).

[b] Find n (x) in the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \div \frac{x^2 + x + 1}{2x - 2}$$

---

4 [a] If $n_1(x) = \frac{2x}{2x+8}$ and $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, then prove that :** $n_1 = n_2$

[b] **Find the solution set of the equations in $\mathbb{R} \times \mathbb{R}$:** $x - 2y = 0$, $x^2 + y^2 = 20$

---

5 [a] If $n(x) = \frac{x^2 - 3x}{(x-3)(x^2+1)}$ **, find :** $n^{-1}(x)$ in the simplest form , showing the domain.

[b] If A and B are two events from the sample space of a random experiment , P (A) = 0.8 , P (B) = 0.5 and P (A ∩ B) = 0.4

, then find : 1 P (Á)   2 P (A ∪ B)   3 P (A – B)

15 El-Fayoum Governorate

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer :

1 The two straight lines $x = 2$, $y + 3 = 0$ are intersecting in the .... quadrant.

(a) first. (b) second. (c) third. (d) fourth.

2 If $x^2 + a x - 4 = (x - 2)(x + 2)$, then a = ...

(a) – 2 (b) 0 (c) 2 (d) 4

3 If the two equations : $x + 4y = 7$, $x + (k - 1)y = 7$ have an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 5 (b) 7 (c) 12 (d) 13

4 The set of zeroes of the function f : $f(x)$ = zero is ....

(a) $\mathbb{R} - \{0\}$ (b) ∅ (c) zero. (d) $\mathbb{R}$

5 If A ⊂ S of a random experiment and P (A) = 3 P (Á) , then P (A) = ...

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$

6 The domain of the function f : $f(x) = \frac{4x}{x-5}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{5\}$ (c) $\mathbb{R} - \{4 , 5\}$ (d) $\mathbb{R} - \{0\}$

---

2 [a] **Find $f(x)$ in the simplest form , showing the domain of f :**

$$f(x) = \frac{x^2 + x + 1}{x} \times \frac{x^2 - x}{x^3 - 1}$$

[b] A rectangle is with a length more than its width by 3 cm. , if the perimeter of the rectangle is 30 cm. , find the area of the rectangle.

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x = y + 1$, $x^2 + y^2 = 13$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x) = \frac{x^2 - 5x + 6}{x^2 - 6x + 9} - \frac{4 - x}{x - 3}$

---

4 **[a]** If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ **, prove that :** $n_1 = n_2$

[b] If A and B are two events from the sample space S of a random experiment

, and $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{6}$

, find : 1 The probability of occuring one of the two events at least.

2 $P(A - B)$

---

5 **[a] Find in $\mathbb{R}$ the solution set of the following equation by using the general formula :**

$2x^2 - 4x + 1 = 0$ (approximating the result to one decimal place).

[b] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$

, and its domain is $\mathbb{R} - \{2\}$ **, find :** the values of a and b

16 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 The solution set of the two equations : $x - 5 = 0$, $y = 2$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(-5, 2)\}$ (b) $\{(5, 2)\}$ (c) $\{(2, 5)\}$ (d) $\varnothing$

2 $13400000 = 1.34 \times$ ....

(a) 10^7 (b) 10^{-7} (c) 10^6 (d) 10^{-6}

3 If A and B are two events from the sample space of a random experiment

, $A \subset B$, then $P(A \cup B) =$ ....

(a) zero. (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

4 $[3, 5] - \{3\} =$ ....

(a) $[2, 5]$ (b) $]3, 5]$ (c) $]3, 5[$ (d) $[3, 5[$

5 The set of zeroes of the function $f : f(x) = x^2 - 2x + 1$ is ....

(a) $\{1, -1\}$ (b) $\{1\}$ (c) $\{2, -1\}$ (d) $\{0, 1\}$

6 If $\frac{a}{3} = \frac{b}{5}$, then $5a - 3b + 8 =$ ....

(a) zero. (b) 16 (c) 8 (d) 10

2 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 4$, $3x + 2y = 7$

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$$

---

3 **[a] Find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 4x + 1 = 0$ by using the general formula.

[b] Find n (x) in the simplest form , showing the domain of n :

$$n(x) = \frac{x^2+2x-3}{x+3} \times \frac{x+1}{x^2-1}$$

---

4 [a] Two positive real numbers , the difference between them is 1 and the sum of their squares is 25 , find the two numbers.

[b] If $n_1(x) = \frac{3x}{3x+15}$, $n_2(x) = \frac{x^2+5x}{x^2+10x+25}$ **, prove that :** $n_1 = n_2$

---

5 [a] If A and B are two events from the sample space of a random experiment , P (A) = 0.8 , P (B) = 0.7 and P (A ∩ B) = 0.6 **, then find :** 1 P (A − B) 2 P (A ∪ B)

[b] If $n(x) = \frac{x^2-2x}{(x-2)(x^2+2)}$

1 Find $n^{-1}(x)$ in the simplest form and identify the domain of n^{-1}

2 If $n^{-1}(x) = 3$, what is the value of x ?

17 El-Menia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 $\mathbb{R}_+ \cap \mathbb{R}_- =$ ....

(a) $\mathbb{R}$ (b) Ø (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R}_+ \cup \mathbb{R}_-$

2 The set of zeroes of the function f where $f(x) = -2x$ in $\mathbb{R}$ is ....

(a) {0} (b) {−2} (c) {−2 , 0} (d) $\mathbb{R}$

3 If A and B are two mutually exclusive events from the sample space S of a random experiment , then P (A ∩ B) = ...

(a) zero. (b) Ø (c) P (B) (d) P (A)

4 If x is the additive identity , y is the multiplicative identity , then $7^x + 2^y =$ ....

(a) 2 (b) 3 (c) 7 (d) 9

5 The domain of the multiplicative inverse of the function $f : f(X) = \frac{X+2}{X-3}$ is ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-2, 3\}$ (d) $\mathbb{R}$

6 If $3X = 45$, then $\frac{1}{5}X =$ ....

(a) 3 (b) 5 (c) 15 (d) 45

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $X + y = 2$, $y - X = 2$

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X}{X+4} + \frac{X-4}{X^2-16}$$

---

3 [a] **Using the general rule , find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 4X + 1 = 0$, where $\sqrt{3} \simeq 1.7$

[b] **Find the common domain of the two functions n_1 , n_2 where :**

$$n_1(X) = \frac{X^2+4}{X^2-4} \quad , \quad n_2(X) = \frac{7}{X^2+4X+4}$$

---

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $X - y = 4$, $X^2 + y^2 = 10$

[b] **Find n (X) in the simplest form , showing the domain of n :**

$$n(X) = \frac{X^3-8}{X^2-3X+2} \times \frac{X-1}{X^2+2X+4}$$

---

5 [a] If $n(X) = \frac{X^2-X}{X^2-X-2}$ **, find :** $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$

, then find : 1 $P(\acute{A})$ 2 $P(A \cup B)$

18 Assiut Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer :

1 The intersection point of the two straight lines : $X - 1 = 0$, $y = 2$ is ....

(a) (1 , 2) (b) (– 1 , 2) (c) (1 , – 2) (d) (– 1 , – 2)

2 If five times a number equals 45 , then this number is equal to ....

(a) 81 (b) 27 (c) 9 (d) 5

3 If $\{-2, 2\}$ is the set of zeroes of the function f where $f(x) = x^2 + a$, then $a =$ ....

(a) -4 (b) 4 (c) 2 (d) -2

4 If $5^x = 1$, then $x =$ ....

(a) -1 (b) 1 (c) zero. (d) 5

5 If A and B are two events from the sample space of a random experiment, $P(A) = 0.7$, $P(A \cap B) = 0.5$, then $P(A - B) =$ ....

(a) 0.6 (b) 0.4 (c) 0.3 (d) 0.2

6 If $x^2 - 2xy + y^2 = 1$, then $x - y =$ ....

(a) zero. (b) ± 1 (c) 1 (d) -1

---

2 [a] **Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$: $x + 2y = 0$, $x^2 + y^2 = 20$**

[b] **Find n (x) in the simplest form , showing the domain where :**

$$n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2} - \frac{x^2 - 4}{x^2 + x - 2}$$

---

3 [a] **By using the general formula , find the solution set of the equation :**

$x^2 - 2x - 4 = 0$ in $\mathbb{R}$, rounding the result to the nearest one decimal place.

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

---

4 [a] If A and B are two events from the sample space of a random experiment, $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, $P(B) = x$, **find the value of x if :**

1 A and B are mutually exclusive events.

2 $A \subset B$

[b] **Find n (x) in the simplest form , showing the domain where :**

$$n(x) = \frac{3x - 15}{x + 3} \div \frac{5x - 25}{4x + 12}$$

---

5 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x - y = 5$, $x + y = 4$

[b] If the domain of the function n where $n(x) = \frac{(x-1)(x-3)}{x^2 - a}$ is $\mathbb{R} - \{3, -3\}$

1 Find the value of a

2 Find $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

19 Souhag Governorate

Answer the following questions : ***(Calculators are allowed)***

1 Choose the correct answer :

1 If $5^n = 3$, then $125^n =$ ....

(a) 15 (b) 125 (c) 3 (d) 27

2 If $x^2 - y^2 = 40$, $x - y = 8$, then $x + y =$ ....

(a) 32 (b) 5 (c) 48 (d) 8

3 The set of zeroes of D where $D(x) = x^2 - 9$ is ....

(a) $\{3\}$ (b) $\{-3\}$ (c) $\varnothing$ (d) $\{3 , -3\}$

4 If A and B are two mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) =$ ....

(a) zero. (b) $\frac{1}{2}$ (c) 1 (d) $\varnothing$

5 The soluation set of the two equations : $x = y$, $y = 2$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{2\}$ (b) $\{(2 , 0)\}$ (c) $\{(0 , 2)\}$ (d) $\{(2 , 2)\}$

6 $(x - 3)^{zero} =$ .... on condition that $x \neq 3$

(a) zero (b) 1 (c) 3 (d) -1

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $y = x - 1$, $x^2 + y^2 = 25$

[b] If $n_1(x) = \dfrac{x}{x^2 - x}$, $n_2(x) = \dfrac{2x}{2x^2 - 2x}$ **, prove that :** $n_1 = n_2$

---

3 [a] **Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x^2 - 3x - 2 =$ zero (rounding the result to two decimals)

[b] **Find n (x) in its simplest form , showing the domain of n where :**

$$n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \times \frac{x^2 - 4x - 5}{3x - 15}$$

---

4 [a] If A and B are two events from the sample space of a random experiment and $P(A) = \frac{1}{3}$, $P(\grave{B}) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{5}$

, find : 1 P (B) 2 $P(A \cup B)$ 3 $P(A - B)$

[b] **Find n (x) in its simplest form , showing the domain of n where :**

$$n(x) = \frac{x - 5}{x^2 - 6x + 5} - \frac{x}{x - 1}$$

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x = y - 3$, $x + y = 3$

[b] Reduce the algebraic fraction $n(x) = \frac{3x - 9}{x^2 - 5x + 6}$

, then find : n (2) , $n^{-1}(2)$ if possible.

20 Qena Governorate

Answer the following questions : ***(Calculators are permitted)***

1 **Choose the correct answer from those given :**

1 If the domain of the function n : $n(x) = \frac{x}{x - k}$ is $\mathbb{R} - \{3\}$, then k = ...

(a) -3 (b) 3 (c) ± 3 (d) 9

2 $\sqrt{64 + 36} = 8 +$ ....

(a) 6 (b) 9 (c) 2 (d) 10

3 If the point (a – 2 , zero) is the vertex of the quadratic function f and the solution set of the equation $f(x) =$ zero is $\{5\}$, then a = ...

(a) 2 (b) -2 (c) 7 (d) 5

4 If $|x| = 7$, then $x =$ ....

(a) 7 (b) ± 7 (c) -7 (d) 14

5 If A and B are two events from the sample space of a random experiment , $A \subset B$, then $P(A \cap B) =$ ....

(a) zero. (b) P (A) (c) P (B) (d) $P(A \cup B)$

6 If $2^{x-1} = 1$, then $x =$ ....

(a) 1 (b) zero. (c) ± 1 (d) 2

2 **[a] Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$:** $x - y = 4$, $3x + 2y = 7$

[b] Find n (x) in the simplest form , showing the domain :

$$n(x) = \frac{x^2 + x + 1}{x} \times \frac{x^2 - x}{x^3 - 1}$$

3 **[a] By using the general rule , find the solution set of the equation in $\mathbb{R}$:**

$x(x - 2) = 1$ (approximating to the nearest one decimal)

[b] Find n (x) in the simplest form , showing the domain : $n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x - 1}{x^2 + 2x - 3}$

4 **[a]** The length of a rectangle is 3 cm. more than its width , and its area is 28 cm^2. Find its perimeter.

[b] If $n_1(x) = \frac{x}{x^2 - 2x}$, $n_2(x) = \frac{x + 1}{x^2 - x - 2}$, show whether $n_1 = n_2$ or not and why.

5 [a] If the set of zeroes of the function f where $f(X) = X^2 - 10X + a$ is $\{5\}$
, find : the value of a

[b] If A and B are two events from the sample space of a random experiment , $P(A) = 0.3$
, $P(B) = 0.6$, $P(A \cap B) = 0.2$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$ 3 $P(\grave{A})$

21 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $f(X) = X^3 - m$, and the set of zeroes $= \{2\}$, then m = ...

(a) $\sqrt{2}$ (b) 2   (c) 4   (d) 8

2 If a number is formed from two digits , its units digit is X and its tens digit is y , then its value is ....

(a) $10Xy$ (b) $X + y$ (c) $X + 10y$ (d) $y + 10X$

3 If A and B are two mutually exclusive events , then $A \cap B$ = ...

(a) {zero}   (b) zero   (c) A   (d) $\varnothing$

4 If $a + b = ab = 7$, then $a^2b + ab^2$ = ...

(a) 7   (b) 14   (c) 49   (d) 17

5 If $\frac{X}{y} = \frac{2}{5}$, then $\frac{5X}{2y}$ = ...

(a) 1   (b) 10   (c) 5   (d) $\frac{4}{25}$

6 The double of the square of the number X equals ....

(a) $2X$ (b) $4X^2$ (c) $2X^2$ (d) $4X$

---

2 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the S.S. of the equations :** $3X + 4y = 11$, $2X + y - 4 = 0$

[b] If $n_1(X) = \frac{X^2 - 4}{X^2 + X - 6}$, $n_2(X) = \frac{X^2 - X - 6}{X^2 - 9}$ **, prove that :** $n_1(X) = n_2(X)$
for all values of X which belong to the common domain and find this domain.

---

3 [a] **Find in $\mathbb{R}$ the S.S. of the equation :** $3X^2 = 5X - 1$ approximating the result to the nearest two decimal digits.

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} - \frac{9 - X^2}{X^2 + X - 6}$$

4 [a] If $n(x) = \frac{x^2 + 9x + 20}{x^2 - 16}$ **, find :** $n^{-1}(x)$ in the simplest form , showing the domain.

[b] A rectangle is with length more than its width by 3 cm. and its area = 28 cm^2.
Find its perimeter.

---

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^3 - 1}{x^2 - x} \times \frac{x + 3}{x^2 + x + 1}$

[b] If A and B are two events from the sample space of a random experiment , P (A) = 0.8 , P (B) = 0.7 , P (A ∩ B) = 0.6

, find : 1 P (À)

2 The probability of occurrence of at least one of the two events.

3 P (A – B)

22 Aswan Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The set of zeroes of the function $f : f(x) = x - 3$ is ....

(a) {0} (b) ∅ (c) {3} (d) ℝ – {3}

2 Half of the number 2^8 equals ....

(a) 2^2 (b) 2^4 (c) 2^5 (d) 2^7

3 If A and B are two mutually exclusive events from the sample space of a random experiment , then A ∩ B = ...

(a) ∅ (b) zero. (c) $\frac{1}{2}$ (d) 1

4 The solution set of the two equations : y – 3 = 0 , $x + y = 0$ in ℝ × ℝ is ....

(a) {3 , –3} (b) {(–3 , 3)} (c) {(0 , 3)} (d) {–3}

5 If the expression : $x^2 + k x + 25$ is a perfect square , then k = ...

(a) ± 5 (b) ± 15 (c) ± 10 (d) ± 20

6 If $2^5 \times 3^5 = 6^m$, then m = ...

(a) 3 (b) 5 (c) 10 (d) 15

---

2 [a] **Find the solution set of the following two equations in ℝ × ℝ :**

$x + y = 7$, $2x - y = 5$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$ **, find :** $n^{-1}(x)$ in its simplest form , showing the domain of n^{-1}

3 [a] **Find by using the general formula in $\mathbb{R}$ the solution set of the equation :**

$2x^2 - 5x + 1 = 0$ (approximating the result to the nearest two decimal places).

[b] **Find n (X) in its simplest form , showing the domain where :**

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$

---

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :** $x - y = 0$, $xy = 9$

[b] **Find n (X) in its simplest form , showing the domain where :**

$$n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$$

---

5 [a] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

[b] If A and B are events from the sample space of a random experiment , P (A) = 0.5 , P (B) = 0.3 , P (A ⋃ B) = 0.7

, find : 1 P (A ⋂ B) 2 P (A – B)

23 New Valley Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 If A and B are two mutually exclusive events from the sample space of a random experiment , then P (A ⋂ B) = ...

(a) zero. (b) ∅ (c) 1 (d) $\frac{1}{2}$

2 The set of zeroes of f where $f(x) = -3x$ is ....

(a) {– 3} (b) {zero} (c) {zero , – 3} (d) {3}

3 If the curve of the function f where $f(x) = x^2 - a$ passes through the point (2 , 0) , then a = ...

(a) – 2 (b) 2 (c) 4 (d) – 4

4 If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is ....

(a) 1 : 2 (b) 2 : 1 (c) 4 : 1 (d) 1 : 4

5 A rectangle is of perimeter 14 cm. , if the length of the rectangle = X cm. and its width = y cm. , then y = ...

(a) 7 (b) $7 - x$ (c) $7 + x$ (d) $14 - x$

6 If $x + \frac{1}{x} = 2 + \frac{1}{2}$, then X = ...

(a) $2\frac{1}{2}$ (b) $1\frac{1}{2}$ (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

2 [a] **Solve in $\mathbb{R}$ the equation :** $x^2 - 4x + 1 =$ zero , by using the general formula.

[b] **Find n (x) in the simplest form , showing the domain where :**

$$n(x) = \frac{x^2 - 6x + 9}{x^2 - 5x + 6} + \frac{x^2 + 2x + 4}{x^3 - 8}$$

---

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $y - x = 1$, $xy = 6$

[b] **Find n (x) in the simplest form , showing the domain where :**

$$n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x + 3}$$

---

4 [a] If A and B are two events of a random experiment and $P(A) = 0.7$, $P(B) = 0.5$, $P(A \cap B) = 0.3$, **then find :**

1. $P(B')$
2. $P(A \cup B)$
3. $P(A - B)$

[b] If $n(x) = \frac{x - a}{x - 3}$, $n^{-1}(x) = \frac{x - 3}{x + 2}$, **find :**

1. The value of a
2. n (4)

---

5 [a] If $n(x) = \frac{x^3 + x^2 - 2}{x - 1}$, then reduce n (x) to the simplest form , showing the domain of n

[b] **Find the solution set of the following two equations graphically in $\mathbb{R} \times \mathbb{R}$:**

$y = 2x - 3$ and $x + 2y = 4$

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1. The solution set of the inequality $x \leq 1$ in $\mathbb{N}$ is ....
   (a) $\{1\}$ (b) $\{0\}$ (c) $\{0 , 1\}$ (d) $\{1 , 0 , -1 , ...\}$
2. The probability of the impossible event equals ....
   (a) zero. (b) 1 (c) -1 (d) $\frac{1}{2}$
3. $x^5 \times x^{-3} = x^{\cdots\cdots}$
   (a) 8 (b) 2 (c) -2 (d) -8
4. The solution set of the two equations : $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $\mathbb{R}$ (b) $\varnothing$ (c) $\{(4 , 3)\}$ (d) $\{(3 , 4)\}$
5. The simplest form of the function f where $f(x) = \frac{3x}{x + 1} \div \frac{x}{x + 1}$ is .... where $x \notin \{-1 , 0\}$
   (a) 3 (b) 1 (c) -1 (d) -3

6 If $A \subset S$ of a random experiment and $P(A) = \frac{1}{3}$, then $P(\acute{A}) =$ ....

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) 1

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations algebraically :** $x + y = 2$, $x - y = 2$

[b] **Simplify n (x) to the simplest form , showing the domain where :**

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

---

3 [a] **Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x^2 - 5x + 1 = 0$ (rounding the result to one decimal).

[b] **Find n (x) in the simplest form , showing the domain where :** $n(x) = \frac{x}{x-2} - \frac{x}{x+2}$

---

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$, $x^2 + xy + y^2 = 27$

[b] **Find n (x) in the simplest form , showing the domain where :**

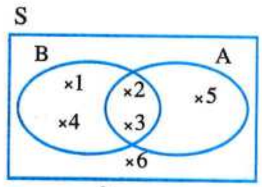
$$n(x) = \frac{x^2 + 2x}{x^2 - 9} \div \frac{2x}{x + 3}$$

---

5 [a] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

[b] **In the opposite figure :**

If A and B are two events from the sample space S of a random experiment **, then find :**



1 $P(A \cap B)$

2 $P(A - B)$

3 The probability of non-occurrence of the event A

25 North Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The set of zeroes of the function $f : f(x) = x^2 - 9$ is ....

(a) $\{3\}$ (b) $\{-3\}$ (c) $\{-3 , 3\}$ (d) $\varnothing$

2 If $7^{x-4} = 1$, then $3x =$ ....

(a) 12 (b) 4 (c) 3 (d) 7

3 $\sqrt{64}+\sqrt[3]{36}=$ ....

(a) 14 (b) 10 (c) 64 (d) 36

4 If $(8 , x-3)=(y^3 , 4)$, then $x+y=$ ....

(a) 8 (b) 4 (c) 3 (d) 9

5 The probability of the impossible event equals ....

(a) $\frac{1}{2}$ (b) 1 (c) zero. (d) $\varnothing$

6 The two straight lines : $x-4y=5$, $x-4y=9$ are ....

(a) perpendicular. (b) parallel. (c) coincide. (d) intersecting.

---

2 [a] **Find in $\mathbb{R}$ the solution set of the equation :**

$x^2-3x+1=0$ by using the formula rounding the result to two decimal places.

[b] **Find n (x) in the simplest form , showing the domain where :**

$$n(x)=\frac{x}{x-3}+\frac{3x+3}{x^2-2x-3}$$

---

3 [a] If $n_1(x)=\frac{2x}{2x-6}$, $n_2(x)=\frac{x^2-3x}{x^2-6x+9}$, **prove that :** $n_1=n_2$

[b] **Find in $\mathbb{R}\times\mathbb{R}$ the solution set of the two equations algebraically :**

$x-y=1$, $xy=12$

---

4 [a] **Find n (x) in the simplest form , showing the domain :** $n(x)=\frac{x^2-3x}{x^2-x}\times\frac{x^2+x-2}{x^2-9}$

[b] **Find the solution set of the two equations in $\mathbb{R}\times\mathbb{R}$:**

$2x+y=5$, $x-y=7$ algebraically.

---

5 [a] If $n(x)=\frac{x^2-2x}{x^2-3x+2}$, **find :** $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

[b] If A and B are two events of a random experiment , and P (A) = 0.4 , P (B) = 0.5 , P (A ∩ B) = 0.2

, find : 1 P (Á) 2 P (A ∪ B) 3 P (A – B)

26 Red Sea Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If A and B are two events from the sample space of a random experiment , A ⊂ B , then P (A ∪ B) = ...

(a) zero. (b) P (A) (c) P (B) (d) P (A ∩ B)

2 The solution set of the two equations : $x = 2$, $y = 5$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2, 5)\}$ (b) $\{(5, 2)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

3 The domain of the function $f : f(x) = x^2 - 4$ is ....

(a) $\{2, -2\}$ (b) $\mathbb{R} - \{2, -2\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{4\}$

4 If $a - b = 3$, $a + b = 2$, then $a^2 - b^2 =$ ....

(a) 5 (b) 6 (c) 1 (d) 36

5 If $f(x) = x + 4$, then $f(x) =$ zero when $x =$ ....

(a) 4 (b) ± 2 (c) -2 (d) -4

6 If $x \neq 0$, then $\frac{x+1}{x} - \frac{1}{x} =$ ....

(a) 1 (b) $\frac{1}{x}$ (c) $\frac{x+2}{x}$ (d) -1

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations algebraically :**

$2x - y = 3$, $x + 2y = 4$

[b] **Put in the simplest form , showing the domain :** $n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$

---

3 [a] **Put in the simplest form , showing the domain :** $n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$

[b] **Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x^2 - 3x - 2 =$ zero

---

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations algebraically :**

$x - y = 2$, $x^2 + y^2 = 10$

[b] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

---

5 [a] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1 **Find :** $n^{-1}(x)$ in the simplest form and identify the domain of n^{-1}

2 If $n^{-1}(x) = 3$ **, find :** the value of x

[b] If A and B are two events of the sample space of a random experiment , $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ **, find $P(A \cup B)$ in each of the following cases :**

1 $P(A \cap B) = \frac{1}{8}$

2 A and B are mutually exclusive events.

27 Matrouh Governorate

Answer the following questions : *(Calculators are allowed)*

1 Choose the correct answer from those given :

1 The set of zeroes of the function f where $f(x) = x^2 - x$ is ....

(a) $\{0\}$ (b) $\{0, -1\}$ (c) $\{0, 1\}$ (d) $\{(0, 1)\}$

2 $a^5 \times a^{-5} =$ .... , $a \neq 0$

(a) a^{10} (b) 1 (c) zero. (d) a

3 The value of x that satisfies the equation : $x^2 = 9$ where $x \in \mathbb{N}$ is ....

(a) -3 (b) 3 (c) $\pm\sqrt{3}$ (d) ± 3

4 If a fair die is rolled once , then the probability of getting an odd number is ....

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) 1 (d) 3

5 Double the number $\frac{1}{2}$ equals ....

(a) $\frac{1}{4}$ (b) 4 (c) 1 (d) 2

6 If the sum of two positive numbers is 7 and their product is 12 , then the two numbers are ....

(a) 2 , 5 (b) 2 , 6 (c) 3 , 4 (d) 1 , 6

---

2 **[a]** If $n(x) = \frac{x^2 + x + 1}{x} \div \frac{x^3 - 1}{x^2 - x}$ **, find :** n (x) in its simplest form , showing the domain.

[b] Find the solution set for the equation : $x^2 - 4x + 1 = 0$ in $\mathbb{R}$ using the general rule , rounding the result to two decimals.

---

3 **[a] Find the solution set of the two equations in** $\mathbb{R} \times \mathbb{R}$ **:** $2x - y = 5$, $x + 5y = 8$

[b] If $n_1(x) = \frac{x}{x + 2}$, $n_2(x) = \frac{2x}{2x + 4}$ **, prove that :** $n_1 = n_2$

---

4 **[a]** Find the set of zeroes of the function f where $f(x) = x^2 - 8x + 15$ in $\mathbb{R}$

[b] If $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x - 5}{x^2 - 6x + 5}$ **, find :** n (x) in its simplest form , showing the domain.

---

5 **[a] Find the solution set of the two equations in** $\mathbb{R} \times \mathbb{R}$ **:** $x - y = 1$, $x^2 + y^2 = 13$

[b] If A and B are two mutually exclusive events from the sample space of a random experiment , where $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$

Answers of governorates' examinations of algebra & probability

1 Cairo

1

1 a 2 b 3 d 4 b 5 c 6 a

2

[a] $\because x^2 - 3x + 1 = 0$

$\therefore a = 1 \quad , \quad b = -3 \quad , \quad c = 1$

$\therefore x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{3 \pm \sqrt{5}}{2}$

$\therefore x \approx 2.6$ or $x \approx 0.4$

$\therefore$ The S.S. $= \{2.6 , 0.4\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x^2-2x+4)} \times \frac{x^2-2x+4}{x}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , -2\}$

$, n(x) = 1$

3

[a] $\because x = 5$ (1)

$, x^2 + y^2 = 29$ (2)

Substituting from (1) in (2) :

$\therefore 5^2 + y^2 = 29 \qquad \therefore 25 + y^2 = 29$

$\therefore y^2 = 4 \qquad \therefore y = 2$ or $y = -2$

$\therefore$ The S.S. $= \{(5 , 2) , (5 , -2)\}$

[b] $\because n(x) = \frac{(x-1)(x+1)}{(x-1)(x^2+x+1)} - \frac{1}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = \frac{x+1}{x^2+x+1} - \frac{1}{x^2+x+1}$

$= \frac{x+1-1}{x^2+x+1} = \frac{x}{x^2+x+1}$

4

[a] $\because 2x + y = 3$ (1)

$, 3x - y = 7$ (2)

Adding (1) and (2) :

$\therefore 5x = 10 \qquad \therefore x = 2$

Substituting in (1) : $\therefore y = -1$

$\therefore$ The S.S. $= \{(2 , -1)\}$

[b] $\because n(x) = \frac{x-1}{(x-1)(x-3)} + \frac{x+3}{(x+3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 3 , -3\}$

$, n(x) = \frac{1}{x-3} + \frac{1}{x-3} = \frac{2}{x-3}$

$, n(1)$ is undefined because $1 \notin$ the domain of n

5

[a] 1 $\because$ A , B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

2 $P(A) = 1 - P(\acute{A}) = 1 - 0.5 = 0.5$

3 $\because P(A \cup B) = P(A) + P(B)$

$\therefore P(B) = P(A \cup B) - P(A) = 0.8 - 0.5 = 0.3$

[b] $\because n(x) = \frac{(x+2)(x+5)}{3(x+5)}$

$\therefore n^{-1}(x) = \frac{3(x+5)}{(x+2)(x+5)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{-2 , -5\}$

$, n^{-1}(x) = \frac{3}{x+2}$

2 Giza

1

1 a 2 b 3 a 4 a 5 c 6 c

2

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

[b] $\because 2x - y = 3$, multiplying by 2

$\therefore 4x - 2y = 6$ (1)

$, \because x + 2y = 4$ (2)

Adding (1) and (2) :

$\therefore 5x = 10 \qquad \therefore x = 2$

Substituting in (2) : $\therefore y = 1$

3

[a] 1 $\because n(x) = \frac{x(x-2)}{(x-1)(x-2)}$

$\therefore n^{-1}(x) = \frac{(x-1)(x-2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$, n^{-1}(x) = \frac{x-1}{x}$

2 $\because n^{-1}(x) = 3$

$\therefore 3 = \frac{x-1}{x}$ $\quad \therefore 3x = x - 1$

$\therefore 3x - x = -1$ $\quad \therefore 2x = -1$ $\quad \therefore x = -\frac{1}{2}$

[b] $\because n(x) = \frac{x(x+2)}{(x+3)(x-3)} \div \frac{2x}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 3, -3\}$

$, n(x) = \frac{x(x+2)}{(x+3)(x-3)} \times \frac{x+3}{2x} = \frac{x+2}{2(x-3)}$

4

[a] $\because n(x) = \frac{x^2+2x+4}{(x-2)(x^2+2x+4)} + \frac{(x+3)(x-3)}{(x+3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

$, n(x) = \frac{1}{x-2} + \frac{x-3}{x-2} = \frac{x-2}{x-2} = 1$

[b] $\because 3x^2 - 5x + 1 = 0$

$\therefore a = 3$, $b = -5$, $c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43$ or $x \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

5

[a] $\because x + y = 5$

$\therefore x = 5 - y$ (1)

$, x^2 + y^2 = 13$ (2)

Substituting from (1) in (2) :

$\therefore (5-y)^2 + y^2 = 13$

$\therefore 25 - 10y + y^2 + y^2 - 13 = 0$

$\therefore 2y^2 - 10y + 12 = 0$

Dividing by (2) : $\therefore y^2 - 5y + 6 = 0$

$\therefore (y-3)(y-2) = 0$ $\quad \therefore y = 3$ or $y = 2$

Substituting in (1) : $\therefore x = 2$ or $x = 3$

$\therefore$ The S.S. $= \{(2, 3), (3, 2)\}$

[b] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$

$, n_1(x) = \frac{x}{x+4}$ (1)

$, \because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$

$, n_2(x) = \frac{x}{x+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3 Alexandria

1

1 d 2 b 3 c 4 d 5 c 6 a

2

[a] $\because 2x - y = 3$, multiplying by 2

$\therefore 4x - 2y = 6$ (1)

$, \because x + 2y = 4$ (2)

Adding (1) and (2) :

$\therefore 5x = 10$ $\quad \therefore x = 2$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because 2x^2 - 4x + 1 = 0$

$\therefore a = 2$, $b = -4$, $c = 1$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$

$\therefore x \approx 1.7$ or $x \approx 0.3$

$\therefore$ The S.S. $= \{1.7, 0.3\}$

3

[a] $\because x - y = 1$ $\quad \therefore x = y + 1$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$

Dividing by 2 : $\therefore y^2 + y - 12 = 0$

$\therefore (y+4)(y-3) = 0$ $\quad \therefore y = -4$ or $y = 3$

Substituting in (1) : $\therefore x = -3$ or $x = 4$

$\therefore$ The S.S. $= \{(-3, -4), (4, 3)\}$

[b] $\because n(X) = \frac{X(X+2)}{(X+2)(X-2)} + \frac{X-3}{(X-3)(X-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, 3, -2\}$

$, n(X) = \frac{X}{X-2} + \frac{1}{X-2} = \frac{X+1}{X-2}$

4

[a] $\because n(X) = \frac{(X-1)(X^2+X+1)}{X(X-1)} \times \frac{X+3}{X^2+X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$

$, n(X) = \frac{X+3}{X}$

[b] $\because n_1(X) = \frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$, $n_1(X) = \frac{X}{X+4}$ (1)

$, \because n_2(X) = \frac{X(X+4)}{(X+4)(X+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$, $n_2(X) = \frac{X}{X+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$, n^{-1}(X) = \frac{X-1}{X}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

4 El-Kalyoubia

1

1 d 2 d 3 a 4 a 5 d 6 c

2

[a] $\because X^2 - X - 4 = 0$

$\therefore a = 1 , b = -1 , c = -4$

$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$\therefore X \simeq 2.56$ or $X \simeq -1.56$

$\therefore$ The S.S. $= \{2.56 , -1.56\}$

[b] $\because f(X) = \frac{3(X-5)}{X+3} \times \frac{4(X+3)}{5(X-5)}$

$\therefore$ The domain of $f = \mathbb{R} - \{-3, 5\}$

$, f(X) = \frac{12}{5}$

3

[a] $\because n_1(X) = \frac{X^2}{X^2(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$, $n_1(X) = \frac{1}{X-1}$ (1)

$, \because n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$, $n_2(X) = \frac{1}{X-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because 2X - y = 4$ (1)

$, X + y = 5$ (2)

Adding (1) and (2) :

$\therefore 3X = 9$ $\therefore X = 3$

Substituting in (2) : $\therefore y = 2$

4

[a] $\because f(X) = \frac{X^2+X+1}{(X-1)(X^2+X+1)} - \frac{X(X+1)}{(X-1)(X+1)}$

$\therefore$ The domain of $f = \mathbb{R} - \{1, -1\}$

$, f(X) = \frac{1}{X-1} - \frac{X}{X-1} = \frac{1-X}{X-1} = \frac{-(X-1)}{X-1} = -1$

[b] $\because X - y = 1$ $\therefore X = y + 1$ (1)

$, X^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$

Dividing by 2 : $\therefore y^2 + y - 12 = 0$

$\therefore (y+4)(y-3) = 0$ $\therefore y = -4$ or $y = 3$

Substituting in (1) : $\therefore X = -3$ or $X = 4$

$\therefore$ The S.S. $= \{(-3, -4), (4, 3)\}$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.2 + 0.5 - 0.1 = 0.6$

2 $P(A - B) = P(A) - (A \cap B) = 0.2 - 0.1 = 0.1$

[b] $\because$ Let the length be x cm. and the width be y cm.

$\therefore x - y = 4$ (1)

, $2(x + y) = 28$

$\therefore x + y = 14$ (2)

Adding (1) and (2) : $\therefore 2x = 18 \quad \therefore x = 9$

Substituting in (1) : $\therefore y = 5$

$\therefore$ The length = 9 cm. , the width = 5 cm.

$\therefore$ The area of the rectangle $= 9 \times 5 = 45$ cm^2.

5 El-Sharkia

1

1 c   2 a   3 a   4 b   5 d   6 b

2

[a] $\because x + y = 4 \qquad \therefore x = 4 - y$ (1)

, $3x + 2y = 14$ (2)

Substituting from (1) in (2) :

$\therefore 3(4 - y) + 2y = 14$

$\therefore 12 - 3y + 2y = 14$

$\therefore -y = 2 \qquad \therefore y = -2$

Substituting in (1) : $\therefore x = 6$

$\therefore$ The S.S. $= \{(6, -2)\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)} \div \frac{x^2+x+1}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, -1, -3\}$

, $n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)} \times \frac{x+3}{x^2+x+1} = \frac{x+3}{x+1}$

, $n(-3)$ is undefined because $-3 \notin$ the domain of n

3

[a] $\because x^2 - 2x - 4 = 0$

$\therefore a = 1 \quad , \quad b = -2 \quad , \quad c = -4$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$

$\therefore x \approx 3.24$ or $x \approx -1.24$

$\therefore$ The S.S. $= \{3.24, -1.24\}$

[b] $\because n(x) = \frac{x(x+3)}{(x+3)(x-1)} + \frac{x-2}{(x-2)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, 2, -3\}$

, $n(x) = \frac{x}{x-1} + \frac{1}{x-1} = \frac{x+1}{x-1}$

4

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$ }(1)

, $n_1(x) = \frac{x}{x+4}$

, $\because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$ }(2)

, $n_2(x) = \frac{x}{x+4}$

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because y - x = 2 \qquad \therefore y = x + 2$ (1)

, $x^2 + xy - 12 = 0$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + x(x+2) - 12 = 0$

$\therefore x^2 + x^2 + 2x - 12 = 0$

$\therefore 2x^2 + 2x - 12 = 0$

Dividing by 2 : $\therefore x^2 + x - 6 = 0$

$\therefore (x+3)(x-2) = 0 \qquad \therefore x = -3$ or $x = 2$

Substituting in (1) : $\therefore y = -1$ or $y = 4$

$\therefore$ The S.S. $= \{(-3, -1), (2, 4)\}$

5

[a] $\because$ The domain of $f = \mathbb{R} - \{-2, 2\}$

$\therefore x^2 - a = 0$ at each of -2 , 2

$\therefore (-2)^2 - a = 0 \qquad \therefore 4 - a = 0$

$\therefore a = 4 \qquad \therefore f(x) = \frac{x+2}{x^2-4}$

$\therefore f(3) = \frac{3+2}{9-4} = \frac{5}{5} = 1$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.4 + 0.5 - 0.2 = 0.7$

2 The probability of non occurrence of the event $B = P(\bar{B}) = 1 - P(B) = 1 - 0.5 = 0.5$

6 El-Monofia

1

1 a   2 c   3 c   4 a   5 a   6 c

2

[a] $\because 2x - y = 3$ (1)

$, x + 2y = 4$ $\therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4 - 2y) - y = 3$ $\therefore 8 - 4y - y = 3$

$\therefore -5y = -5$ $\therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{6}{(x+3)(x-3)} + \frac{1}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3\}$

$, n(x) = \frac{6 + x - 3}{(x+3)(x-3)} = \frac{x+3}{(x+3)(x-3)} = \frac{1}{x-3}$

3

[a] $\because x - y = 0$ $\therefore x = y$ (1)

$, 2x^2 - y^2 = 4$ (2)

Substituting from (1) in (2) :

$\therefore 2y^2 - y^2 = 4$ $\therefore y^2 = 4$

$\therefore y = 2$ or $y = -2$

Substituting in (1) :

$\therefore x = 2$ or $x = -2$

$\therefore$ The S.S. $= \{(2, 2), (-2, -2)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 3\}$ } (1)

$, n_1(x) = \frac{1}{x-3}$

$, \because n_2(x) = \frac{x}{x(x-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 3\}$ } (2)

$, n_2(x) = \frac{1}{x-3}$

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because x^2 - 6x + 4 = 0$

$\therefore a = 1$, $b = -6$, $c = 4$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$

$\therefore x \approx 5.24$ or $x \approx 0.76$

$\therefore$ The S.S. $= \{5.24, 0.76\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{x-1} \times \frac{x+3}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = x + 3$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

2 $P(A - B) = P(A) - P(A \cap B) = 0.8 - 0.6 = 0.2$

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$, n^{-1}(x) = \frac{x-1}{x}$

2 $\because n^{-1}(x) = 2$ $\therefore \frac{x-1}{x} = 2$

$\therefore 2x = x - 1$ $\therefore x = -1$

7 El-Gharbia

1

1 b   2 b   3 c   4 a   5 d   6 c

2

[a] $\because x - y = 4$ (1)

$, 2x + y = 5$ (2)

Adding (1) and (2) :

$\therefore 3x = 9$ $\therefore x = 3$

Substituting in (1) : $\therefore y = -1$

$\therefore$ The S.S. $= \{(3, -1)\}$

[b] $\because n(x) = \frac{2x}{x+3} + \frac{6}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3\}$

$, n(x) = \frac{2x+6}{x+3} = \frac{2(x+3)}{x+3} = 2$

3

[a] $\because x^2+3x-3=0$

$\therefore a=1 \ , \ b=3 \ , \ c=-3$

$\therefore x=\frac{-3\pm\sqrt{(3)^2-4\times1\times-3}}{2\times1}=\frac{-3\pm\sqrt{21}}{2}$

$\therefore x\approx0.79$ or $x\approx-3.79$

$\therefore$ The S.S. $=\{0.79 \ , -3.79\}$

[b] $\because n_1(x)=\frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-2\}$

$, n_1(x)=\frac{x}{x+2}$ (1)

$, \because n_2(x)=\frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-2\}$

$, n_2(x)=\frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

4

[a] $\because x-4=0 \qquad \therefore x=4$ (1)

$, x^2+y^2=25$ (2)

Substituting from (1) in (2) :

$\therefore (4)^2+y^2=25 \qquad \therefore 16+y^2=25$

$\therefore y^2=9 \qquad \therefore y=3$ or $y=-3$

$\therefore$ The S.S. $=\{(4 \ , 3) \ , (4 \ , -3)\}$

[b] $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.3+0.6-0.2=0.7$

5

[a] $\because n(x)=\frac{(x-1)(x^2+x+1)}{x(x-1)}\times\frac{x+3}{x^2+x+1}$

$\therefore$ The domain of $n=\mathbb{R}-\{0 \ , 1\}$

$, n(x)=\frac{x+3}{x}$

[b] $\because n(x)=\frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x)=\frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1}=\mathbb{R}-\{0 \ , 2 \ , 1\}$

$, n^{-1}(x)=\frac{x-1}{x}$

8 El-Dakahlia

1

[a] 1 a 2 b 3 d

[b] $\because x^2-2x-6=0$

$\therefore a=1 \ , \ b=-2 \ , \ c=-6$

$\therefore x=\frac{2\pm\sqrt{(-2)^2-4\times1\times-6}}{2\times1}=\frac{2\pm2\sqrt{7}}{2}=1\pm\sqrt{7}$

$\therefore x\approx3.65$ or $x\approx-1.65$

$\therefore$ The S.S. $=\{3.65 \ , -1.65\}$

2

[a] 1 c 2 b 3 a

[b] $\because n(x)=\frac{(x-5)(x+3)}{(x-3)(x+3)}\div\frac{2(x-5)}{(x-3)(x-3)}$

$\therefore$ The domain of $n=\mathbb{R}-\{3 \ , -3 \ , 5\}$

$, n(x)=\frac{x-5}{x-3}\times\frac{(x-3)(x-3)}{2(x-5)}=\frac{x-3}{2}$

3

[a] $\because f(3)=0 \qquad \therefore 9a+3b+15=0$

$\therefore 3a+b=-5$ (1)

$, \because f(5)=0 \qquad \therefore 25a+5b+15=0$

$\therefore 5a+b=-3$ (2)

Subtracting (1) from (2) :

$\therefore 2a=2 \qquad \therefore a=1$

Substituting in (1) : $\therefore b=-8$

[b] $\because n_1(x)=\frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{2 \ , -3\}$

$, n_1(x)=\frac{x+2}{x+3}$

$, \because n_2(x)=\frac{(x-3)(x+2)}{(x+3)(x-3)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{3 \ , -3\}$

$, n_2(x)=\frac{x+2}{x+3}$

$\therefore n_1(x)=n_2(x)$

For all values of $x\in\mathbb{R}-\{2 \ , 3 \ , -3\}$

4

[a] $\because n(x) = \frac{x^2+3x+9}{(x-3)(x^2+3x+9)} + \frac{(x-4)(x-4)}{(x-4)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4\}$

$, n(x) = \frac{1}{x-3} + \frac{x-4}{x-3} = \frac{x-3}{x-3} = 1$

[b] Let the length of the hypotenuse = x cm.

, the length of the other side = y cm.

$\therefore x + y + 5 = 30 \quad \therefore x + y = 25$ (1)

$, x^2 = y^2 + 25$ (2)

From (1) : $\therefore x = 25 - y$ (3)

Substituting in (2) : $\therefore (25-y)^2 = y^2 + 25$

$\therefore 625 - 50y + y^2 - y^2 - 25 = 0$

$\therefore 600 - 50y = 0 \quad \therefore 50y = 600$

$\therefore y = 12$ cm.

$\therefore$ The area of the triangle $= \frac{1}{2} \times 12 \times 5 = 30$ cm².

5

[a] 1 $P(A-B) = P(A) - P(A \cap B) = 0.6 - 0.4 = 0.2$

2 The probability of the occurrence of one of the two events at least

$= P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.7 - 0.4 = 0.9$

[b] $\because \frac{x}{x-3} + \frac{k+5-x^2}{x(x-3)} = 0$

$\therefore \frac{x^2+k+5-x^2}{x(x-3)} = 0$

$\therefore k + 5 = 0 \quad \therefore k = -5$

9 Ismailia

1

1 a   2 c   3 b   4 b   5 a   6 c

2

[a] $\because x + y = 4$ (1)

$, 2x - y = 2$ (2)

Adding (1) and (2) :

$\therefore 3x = 6 \quad \therefore x = 2$

Substituting in (1) : $\therefore y = 2$

$\therefore$ The S.S. = $\{(2, 2)\}$

[b] $\because n(x) = \frac{x-3}{(x-3)(x+3)} + \frac{(x+2)(x-4)}{(x+2)(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, -2\}$

$, n(x) = \frac{1}{x+3} + \frac{x-4}{x+3} = \frac{x-3}{x+3}$

3

[a] $\because x^2 - 4x + 2 = 0$

$\therefore a = 1 \;,\; b = -4 \;,\; c = 2$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 2}}{2 \times 1} = \frac{4 \pm 2\sqrt{2}}{2} = 2 \pm \sqrt{2}$

$\therefore x \approx 3.41$ or $x \approx 0.59$

$\therefore$ The S.S. = $\{3.41, 0.59\}$

[b] $\because n_1(x) = \frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$

$, n_1(x) = \frac{x}{x+2}$ (1)

$, \because n_2(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$, n_2(x) = \frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because n(x) = \frac{x-5}{(x+3)(x-5)} \div \frac{8}{2(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3, 5\}$

$, n(x) = \frac{1}{x+3} \times \frac{x+3}{4} = \frac{1}{4}$

[b] $\because x - 3 = 0 \quad \therefore x = 3$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) :

$\therefore (3)^2 + y^2 = 25 \quad \therefore 9 + y^2 = 25$

$\therefore y^2 = 16 \quad \therefore y = 4$ or $y = -4$

$\therefore$ The S.S. = $\{(3, 4), (3, -4)\}$

5

[a] $\because n(H) = \frac{(H-2)(H+2)}{(H-2)(H^2+2H+4)} \times \frac{H^2+2H+4}{(H+2)(H-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

$, n(H) = \frac{1}{H-3}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(\grave{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

10 Suez

1

1 c   2 a   3 b   4 a   5 a   6 d

2

[a] $\because x + y = 4$ (1)

$, 3x - y = 8$ (2)

Adding (1) and (2) :

$\therefore 4x = 12$ $\therefore x = 3$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(3, 1)\}$

[b] $\because n(x) = \frac{x+2}{(x-2)(x+2)} + \frac{x-3}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

$, n(x) = \frac{1}{x-2} + \frac{1}{x-2} = \frac{2}{x-2}$

3

[a] $\because x - y = 0$ $\therefore x = y$ (1)

$, 2x^2 - y^2 = 9$ (2)

Substituting from (1) in (2) :

$\therefore 2y^2 - y^2 = 9$ $\therefore y^2 = 9$

$\therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$

$, n_1(x) = \frac{x}{x+4}$ (1)

$, \because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$

$, n_2(x) = \frac{x}{x+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because x^2 - 6x + 4 = 0$

$\therefore a = 1, b = -6, c = 4$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$

$\therefore x \approx 5.24$ or $x \approx 0.76$

$\therefore$ The S.S. $= \{5.24, 0.76\}$

[b] $\because n(x) = \frac{x+7}{x-2}$ $\therefore n^{-1}(x) = \frac{x-2}{x+7}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{2, -7\}$

5

[a] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = 2$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

2 $P(\grave{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

11 Port Said

1 b   2 d   3 b   4 b   5 a   6 c

7 b   8 a   9 b   10 c   11 c   12 c

13 d   14 a   15 c   16 b   17 a   18 d

19 b   20 d   21 c

22 $\because x^2 - x - 3 = 0$

$\therefore a = 1, b = -1, c = -3$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-3)}}{2 \times 1} = \frac{1 \pm \sqrt{13}}{2}$

$\therefore x \approx 2.3$ or $x \approx -1.3$

$\therefore$ The S.S. $= \{2.3, -1.3\}$

23 $\because n(x) = \frac{x}{x+1} + \frac{1}{x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1\}$

$, n(x) = \frac{x+1}{x+1} = 1$

24 $\because n(x) = \frac{x(x-3)}{(x-3)(x+3)} \times \frac{x+3}{x}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 3, -3\}$

$, n(x) = 1$

12 Damietta

1

1 c 2 b 3 c 4 a 5 d 6 d

2

[a] $\because x^2+3x-3=0$

$\therefore a=1 \ , \ b=3 \ , \ c=-3$

$\therefore x=\frac{-3\pm\sqrt{(3)^2-4\times1\times(-3)}}{2\times1}=\frac{-3\pm\sqrt{21}}{2}$

$\therefore x\approx0.8$ or $x\approx-3.8$

$\therefore$ The S.S. $=\{0.8 \ , -3.8\}$

[b] $\because n(x)=\frac{(x-1)(x^2+x+1)}{(x-1)(x+5)}\times\frac{x+5}{x^2+x+1}$

$\therefore$ The domain of $n=\mathbb{R}-\{1 \ , -5\}$

, $n(x)=1$

3

[a] $\because 2x+y=1 \qquad \therefore y=1-2x$ (1)

, $x+2y=5$ (2)

Substituting from (1) in (2) :

$\therefore x+2(1-2x)=5 \qquad \therefore x+2-4x=5$

$\therefore -3x=3 \qquad \therefore x=-1$

Substituting in (1) : $\therefore y=3$

$\therefore$ The S.S. $=\{(-1 \ , 3)\}$

[b] $\because n(x)=\frac{x-3}{(x-3)(x+3)}+\frac{(x+2)(x-4)}{(x+2)(x+3)}$

$\therefore$ The domain of $n=\mathbb{R}-\{-2 \ , -3 \ , 3\}$

, $n(x)=\frac{1}{x+3}+\frac{x-4}{x+3}=\frac{x-3}{x+3}$

4

[a] $\because x=y$ (1)

, $x^2+y^2=32$ (2)

Substituting from (1) in (2) :

$\therefore y^2+y^2=32 \qquad \therefore 2y^2=32$

$\therefore y^2=16 \qquad \therefore y=4$ or $y=-4$

Substituting in (1) : $\therefore x=4$ or $x=-4$

$\therefore$ The S.S. $=\{(4 \ , 4) \ , (-4 \ , -4)\}$

[b] $\because$ The domain of $n=\mathbb{R}-\{0 \ , 1\}$

$\therefore$ When $x=1 \qquad \therefore x-b=0$

$\therefore 1-b=0 \qquad \therefore b=1$

$\therefore n(x)=\frac{a}{x}+\frac{9}{x-1}$

, $\because n(4)=5$

$\therefore \frac{a}{4}+\frac{9}{4-1}=5 \qquad \therefore \frac{a}{4}+\frac{9}{3}=5$

$\therefore \frac{a}{4}+3=5 \qquad \therefore \frac{a}{4}=2 \qquad \therefore a=8$

5

[a] 1 $P(\acute{A})=1-P(A)=1-0.4=0.6$

2 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.4+0.5-0.2=0.7$

[b] $\because n_1(x)=\frac{1}{x-2}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{2\}$ } (1)

, $\because n_2(x)=\frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{2\}$

, $n_2(x)=\frac{1}{x-2}$ } (2)

From (1) and (2) : $\therefore n_1=n_2$

13 Kafr El-Sheikh

1

1 d 2 d 3 b 4 a 5 c 6 a

2

[a] $\because n(x)=\frac{x^2}{x-1}-\frac{x}{x-1}$

$\therefore$ The domain of $n=\mathbb{R}-\{1\}$

, $n(x)=\frac{x^2-x}{x-1}=\frac{x(x-1)}{x-1}=x$

[b] $\because 2x^2-4x+1=0$

$\therefore a=2 \ , \ b=-4 \ , \ c=1$

$\therefore x=\frac{4\pm\sqrt{(-4)^2-4\times2\times1}}{2\times2}=\frac{4\pm2\sqrt{2}}{4}=\frac{2\pm\sqrt{2}}{2}$

$\therefore x\approx1.71$ or $x\approx0.29$

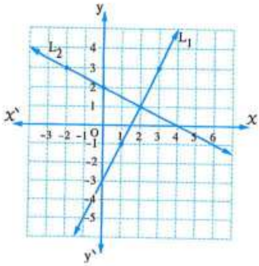
$\therefore$ The S.S. $=\{1.71 \ , 0.29\}$

3

[a] $y=2x-3 \qquad , \qquad x=-2y+4$

x	1	2	3
y	−1	1	3

x	−2	0	2
y	3	2	1



From the graph : $\therefore$ The S.S. $= \{(2 , 1)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \div \frac{x+2}{x^2+3x+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , -2\}$

$, n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+2}$

$= \frac{x}{2-3}$

$, n(2) = \frac{2}{2-3} = -2$

$, n(-2)$ is undefined because $-2 \notin$ the domain of n

4

[a] $\because$ The domain of $n = \mathbb{R} - \{0 , -4\}$

$\therefore$ When $x = -4$ $\quad \therefore x + a = 0 \quad \therefore -4 + a = 0$

$\therefore a = 4 \quad \therefore n(x) = \frac{b}{x} - \frac{9}{x+4}$

$, \because n(5) = 2 \quad \therefore \frac{b}{5} - \frac{9}{5+4} = 2$

$\therefore \frac{b}{5} - 1 = 2 \quad \therefore \frac{b}{5} = 3 \quad \therefore b = 15$

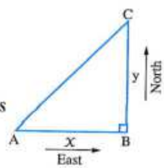
[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

5

[a] In Δ ABC



$\because (AC)^2 = x^2 + y^2$

$, \because$ the sum of the squares of the traveled distances is 25 km^2.

$\therefore x^2 + y^2 = 25$

$\therefore (AC)^2 = 25 \quad \therefore AC = \sqrt{25} = 5$ km.

$\therefore$ The shortest distance between A and C = The length of $\overline{AC}$ = 5 km.

[b] $\because n_1(x) = \frac{(x-2)(x+2)}{(x-2)(x+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2 , -3\}$

$, n_1(x) = \frac{x+2}{x+3}$ $\quad$ (1)

$, \because n_2(x) = \frac{(x-3)(x+2)}{(x-3)(x+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3 , -3\}$

$, n_2(x) = \frac{x+2}{x+3}$ $\quad$ (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

14 El-Beheira

1

1 c	2 a	3 b	4 d	5 b	6 c

2

[a] $\because 2x + y = 5$ $\quad$ (1)

$, 2x - y = 3$ $\quad$ (2)

Adding (1) and (2) :

$\therefore 4x = 8 \quad \therefore x = 2$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(2 , 1)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} + \frac{x-3}{(x-3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 2 , 3\}$

$, n(x) = \frac{x}{x-2} + \frac{1}{x-2} = \frac{x+1}{x-2}$

3

[a] $\because x^2 - 2x - 4 = 0$

$\therefore a = 1 \quad , \quad b = -2 \quad , \quad c = -4$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$

$\therefore x \approx 3.24$ or $x \approx -1.24$

$\therefore$ The S.S. $= \{3.24 , -1.24\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \div \frac{x^2+x+1}{2(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = \frac{x^2+x+1}{x-1} \times \frac{2(x-1)}{x^2+x+1} = 2$

4

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$, $n_1(x) = \frac{x}{x+4}$ (1)

, $\because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$, $n_2(x) = \frac{x}{x+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - 2y = 0 \quad \therefore x = 2y$ (1)

, $x^2 + y^2 = 20$ (2)

Substituting from (1) in (2) : $\therefore (2y)^2 + y^2 = 20$

$\therefore 4y^2 + y^2 = 20 \quad \therefore 5y^2 = 20$

$\therefore y^2 = 4 \quad \therefore y = 2$ or $y = -2$

Substituting in (1) : $\therefore x = 4$ or $x = -4$

$\therefore$ The S.S. $= \{(4, 2), (-4, -2)\}$

5

[a] $\because n(x) = \frac{x(x-3)}{(x-3)(x^2+1)}$

$\therefore n^{-1}(x) = \frac{(x-3)(x^2+1)}{x(x-3)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 3\}$

, $n^{-1}(x) = \frac{x^2+1}{x}$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.8 + 0.5 - 0.4 = 0.9$

3 $P(A - B) = P(A) - P(A \cap B)$
$= 0.8 - 0.4 = 0.4$

15 El-Fayoum

1

1 d 2 b 3 a 4 d 5 d 6 b

2

[a] $\because f(x) = \frac{x^2+x+1}{x} \times \frac{x(x-1)}{(x-1)(x^2+x+1)}$

$\therefore$ The domain of $f = \mathbb{R} - \{0, 1\}$

, $f(x) = 1$

[b] Let the length be x cm. and the width be y cm.

$\therefore x - y = 3$ (1)

, $2(x + y) = 30 \quad \therefore x + y = 15$ (2)

Adding (1) and (2) : $\therefore 2x = 18 \quad \therefore x = 9$

Substituting in (1) : $\therefore y = 6$

$\therefore$ The length = 9 cm. , the width = 6 cm.

$\therefore$ The area of the rectangle $= 9 \times 6 = 54$ cm^2.

3

[a] $\because x = y + 1$ (1)

, $x^2 + y^2 = 13$ (2)

Substituting from (1) in (2) :

$\therefore (y+1)^2 + y^2 = 13$

$\therefore y^2 + 2y + 1 + y^2 - 13 = 0$

$\therefore 2y^2 + 2y - 12 = 0 \quad \therefore y^2 + y - 6 = 0$

$\therefore (y+3)(y-2) = 0 \quad \therefore y = -3$ or $y = 2$

Substituting in (1) : $\therefore x = -2$ or $x = 3$

$\therefore$ The S.S. $= \{(-2, -3), (3, 2)\}$

[b] $\because n(x) = \frac{(x-3)(x-2)}{(x-3)(x-3)} + \frac{x-4}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3\}$

, $n(x) = \frac{x-2}{x-3} + \frac{x-4}{x-3} = \frac{2x-6}{x-3} = \frac{2(x-3)}{x-3} = 2$

4

[a] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$, $n_1(x) = \frac{1}{x-1}$ (1)

, $\because n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$, $n_2(x) = \frac{1}{x-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 The probability of occuring one of the two events at least $= P(A \cup B)$
$= P(A) + P(B) - P(A \cap B)$
$= \frac{2}{3} + \frac{1}{2} - \frac{1}{6} = \frac{4+3-1}{6} = 1$

2 $P(A - B) = P(A) - P(A \cap B)$
$= \frac{2}{3} - \frac{1}{6} = \frac{4-1}{6} = \frac{1}{2}$

5

[a] $\because 2x^2-4x+1=0$

$\therefore a=2 \quad , \quad b=-4 \quad , \quad c=1$

$\therefore x=\frac{4\pm\sqrt{(-4)^2-4\times2\times1}}{2\times2}=\frac{4\pm2\sqrt{2}}{4}=\frac{2\pm\sqrt{2}}{2}$

$\therefore x\approx1.7$ or $x\approx0.3$

$\therefore$ The S.S. $=\{1.7 , 0.3\}$

[b] $\because$ The domain of $f=\mathbb{R}-\{2\}$

$\therefore$ When $x=2$ $\quad \therefore bx+4=0$

$\therefore b\times2+4=0$ $\quad \therefore 2b=-4$ $\quad \therefore b=-2$

, $\because$ the set of zeros of $f=\{3\}$

$\therefore$ When $x=3$ $\quad \therefore x^2-ax+9=0$

$\therefore 9-3a+9=0$ $\quad \therefore 18-3a=0$

$\therefore 3a=18$ $\quad \therefore a=6$

16 Beni Suef

1

1 b 2 a 3 c 4 b 5 b 6 c

2

[a] $\because x-y=4$ $\quad \therefore x=4+y$ $\quad (1)$

$, 3x+2y=7$ $\quad (2)$

Substituting from (1) in (2) :

$\therefore 3(4+y)+2y=7$ $\quad \therefore 12+3y+2y=7$

$\therefore 5y+12=7$ $\quad \therefore 5y=-5$

$\therefore y=-1$

Substituting in (1) : $\therefore x=3$

$\therefore$ The S.S. $=\{(3 , -1)\}$

[b] $\because n(x)=\frac{x-3}{(x-3)(x-4)}+\frac{x-3}{x-3}$

$\therefore$ The domain of $n=\mathbb{R}-\{3 , 4\}$

$, n(x)=\frac{1}{x-4}+1=\frac{1+x-4}{x-4}=\frac{x-3}{x-4}$

3

[a] $\because x^2-4x+1=0$

$\therefore a=1 \quad , \quad b=-4 \quad , \quad c=1$

$\therefore x=\frac{4\pm\sqrt{(-4)^2-4\times1\times1}}{2\times1}=\frac{4\pm2\sqrt{3}}{2}=2\pm\sqrt{3}$

$\therefore x=2+\sqrt{3}$ or $x=2-\sqrt{3}$

$\therefore$ The S.S. $=\{2+\sqrt{3} , 2-\sqrt{3}\}$

[b] $\because n(x)=\frac{(x+3)(x-1)}{x+3}\times\frac{x+1}{(x+1)(x-1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{1 , -1 , -3\}$

$, n(x)=1$

4

[a] Let the two positive real numbers be x and y

$\therefore x-y=1$ $\quad \therefore x=1+y$ $\quad (1)$

$, x^2+y^2=25$ $\quad (2)$

Substituting from (1) in (2) : $\therefore (1+y)^2+y^2=25$

$\therefore 1+2y+y^2+y^2-25=0$

$\therefore 2y^2+2y-24=0$ $\quad \therefore y^2+y-12=0$

$\therefore (y-3)(y+4)=0$

$\therefore y=3$ or $y=-4$ (refused)

Substituting in (1) : $\therefore x=4$

$\therefore$ The two numbers are : 4 , 3

[b] $\because n_1(x)=\frac{3x}{3(x+5)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-5\}$
$, n_1(x)=\frac{x}{5+x}$ $\quad \Big\} (1)$

$, \because n_2(x)=\frac{x(x+5)}{(x+5)(x+5)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-5\}$
$, n_2(x)=\frac{x}{5+x}$ $\quad \Big\} (2)$

From (1) and (2) : $\therefore n_1=n_2$

5

[a] 1 $P(A-B)=P(A)-P(A\cap B)=0.8-0.6=0.2$

2 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.8+0.7-0.6=0.9$

[b] 1 $\because n(x)=\frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x)=\frac{(x-2)(x^2+2)}{x(x-2)}$

, the domain of $n^{-1}=\mathbb{R}-\{0 , 2\}$

$, n^{-1}(x)=\frac{x^2+2}{x}$

2 $\because n^{-1}(X) = 3$

$\therefore \frac{X^2+2}{X} = 3 \qquad \therefore X^2 + 2 = 3X$

$\therefore X^2 - 3X + 2 = 0$

$\therefore (X-1)(X-2) = 0$

$\therefore X = 1 \quad , \quad X = 2$ (refused)

because $2 \notin$ the domain of n^{-1}

17 El-Menia

1

1 b 2 a 3 a 4 b 5 c 6 a

2

[a] $\because X + y = 2$ (1)

$, -X + y = 2$ (2)

Adding (1) and (2) :

$\therefore 2y = 4 \qquad \therefore y = 2$

Substituting in (1) : $\therefore X = 0$

$\therefore$ The S.S. $= \{(0 , 2)\}$

[b] $\because n(X) = \frac{X}{X+4} + \frac{X-4}{(X-4)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , -4\}$

$, n(X) = \frac{X}{X+4} + \frac{1}{X+4} = \frac{X+1}{X+4}$

3

[a] $\because X^2 - 4X + 1 = 0$

$\therefore a = 1 \quad , \quad b = -4 \quad , \quad c = 1$

$\therefore X = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$

$\therefore X = 3.7$ or $X = 0.3$

$\therefore$ The S.S. $= \{3.7 , 0.3\}$

[b] $\because n_1(X) = \frac{X^2+4}{(X-2)(X+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2 , -2\}$

$, \because n_2(X) = \frac{7}{(X+2)(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$\therefore$ The common domain of the two functions n_1 $, n_2 = \mathbb{R} - \{2 , -2\}$

4

[a] $\because X - y = 4 \qquad \therefore X = y + 4$ (1)

$, X^2 + y^2 = 10$ (2)

Substituting from (1) in (2) : $\therefore (y+4)^2 + y^2 = 10$

$\therefore y^2 + 8y + 16 + y^2 - 10 = 0$

$\therefore 2y^2 + 8y + 6 = 0 \qquad \therefore y^2 + 4y + 3 = 0$

$\therefore (y+1)(y+3) = 0 \qquad \therefore y = -1$ or $y = -3$

Substituting in (1) : $\therefore X = 3$ or $X = 1$

$\therefore$ The S.S. $= \{(3 , -1) , (1 , -3)\}$

[b] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X-1)} \times \frac{X-1}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 2\}$

$, n(X) = 1$

5

[a] $\because n(X) = \frac{X(X-1)}{(X+1)(X-2)}$

$\therefore n^{-1}(X) = \frac{(X+1)(X-2)}{X(X-1)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , -1 , 2 , 1\}$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

18 Assiut

1

1 a 2 c 3 a 4 c 5 d 6 b

2

[a] $\because X + 2y = 0 \qquad \therefore X = -2y$ (1)

$, X^2 + y^2 = 20$ (2)

Substituting from (1) in (2) :

$\therefore (-2y)^2 + y^2 = 20 \qquad \therefore 4y^2 + y^2 = 20$

$\therefore 5y^2 = 20 \qquad \therefore y^2 = 4$

$\therefore y = 2$ or $y = -2$

Substituting in (1) : $\therefore X = -4$ or $X = 4$

$\therefore$ The S.S. $= \{(-4 , 2) , (4 , -2)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)} - \frac{(x-2)(x+2)}{(x+2)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 2 , -2\}$

, $n(x) = \frac{x}{x-1} - \frac{x-2}{x-1} = \frac{2}{x-1}$

3

[a] $\because x^2 - 2x - 4 = 0$

$\therefore a = 1 \quad , \quad b = -2 \quad , \quad c = -4$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm 2\sqrt{5}}{2}$

$= 1 \pm \sqrt{5}$

$\therefore x \approx 3.2$ or $x \approx -1.2$

$\therefore$ The S.S. $= \{3.2 , -1.2\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$

, $n_1(x) = \frac{1}{x-1}$ } (1)

, $\because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$

, $n_2(x) = \frac{1}{x-1}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] [1] $\because$ A , B are mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B)$

$\therefore \frac{7}{12} = \frac{1}{3} + x$

$\therefore x = \frac{7}{12} - \frac{1}{3} = \frac{7-4}{12} = \frac{3}{12} = \frac{1}{4}$

[2] $\because A \subset B$

$\therefore P(B) = P(A \cup B) \qquad \therefore x = \frac{7}{12}$

[b] $\because n(x) = \frac{3(x-5)}{x+3} \div \frac{5(x-5)}{4(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3 , 5\}$

, $n(x) = \frac{3(x-5)}{x+3} \times \frac{4(x+3)}{5(x-5)} = \frac{12}{5}$

5

[a] $\because 2x - y = 5$ (1)

, $x + y = 4$ (2)

Adding (1) and (2) :

$\therefore 3x = 9 \qquad \therefore x = 3$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(3 , 1)\}$

[b] [1] $\because$ The domain of the function n

$= \mathbb{R} - \{3 , -3\}$

$\therefore$ At $x = 3 \qquad \therefore x^2 - a = 0$

$\therefore 9 - a = 0 \qquad \therefore a = 9$

[2] $\because n(x) = \frac{(x-1)(x-3)}{x^2-9}$

$\therefore n(x) = \frac{(x-1)(x-3)}{(x-3)(x+3)}$

$\therefore n^{-1}(x) = \frac{(x-3)(x+3)}{(x-1)(x-3)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{1 , 3 , -3\}$

, $n^{-1}(x) = \frac{x+3}{x-1}$

19 Souhag

1

[1] d [2] b [3] d [4] a [5] d [6] b

2

[a] $\because y = x - 1$ (1)

, $x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + (x-1)^2 = 25$

$\therefore x^2 + x^2 - 2x + 1 - 25 = 0$

$\therefore 2x^2 - 2x - 24 = 0 \qquad \therefore x^2 - x - 12 = 0$

$\therefore (x+3)(x-4) = 0 \qquad \therefore x = -3$ or $x = 4$

Substituting in (1) :

$\therefore y = -4$ or $y = 3$

$\therefore$ The S.S. $= \{(-3 , -4) , (4 , 3)\}$

[b] $\because n_1(x) = \frac{x}{x(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$, $n_1(x) = \frac{1}{x-1}$ (1)

, $\because n_2(x) = \frac{2x}{2x(x-1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$, $n_2(x) = \frac{1}{x-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because x^2 - 3x - 2 = 0$

$\therefore a = 1 \quad , \quad b = -3 \quad , \quad c = -2$

$\therefore x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{3 \pm \sqrt{17}}{2}$

$\therefore x \approx 3.56$ or $x \approx -0.56$

$\therefore$ The S.S. $= \{3.56 , -0.56\}$

[b] $\because n(x) = \frac{(x-1)(x-2)}{(x-1)(x+1)} \times \frac{(x+1)(x-5)}{3(x-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1 , 5\}$

, $n(x) = \frac{x-2}{3}$

4

[a] 1 $P(B) = 1 - P(\grave{B}) = 1 - \frac{1}{2} = \frac{1}{2}$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{3} + \frac{1}{2} - \frac{1}{5} = \frac{19}{30}$

3 $P(A - B) = P(A) - P(A \cap B) = \frac{1}{3} - \frac{1}{5} = \frac{2}{15}$

[b] $\because n(x) = \frac{x-5}{(x-1)(x-5)} - \frac{x}{x-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 5\}$

, $n(x) = \frac{1}{x-1} - \frac{x}{x-1} = \frac{1-x}{x-1} = \frac{-(x-1)}{x-1} = -1$

5

[a] $\because x = y - 3$ (1)

, $x + y = 3$ (2)

Substituting from (1) in (2) : $\therefore y - 3 + y = 3$

$\therefore 2y = 6 \qquad \therefore y = 3$

Substituting in (1) : $\therefore x = 0$

$\therefore$ The S.S. $= \{(0 , 3)\}$

[b] $\because n(x) = \frac{3(x-3)}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , 3\}$

, $n(x) = \frac{3}{x-2}$

, $n(2)$, $n^{-1}(2)$ are undefined because

$2 \notin$ the domain of n

20 Qena

1

1 b 2 c 3 c 4 b 5 b 6 a

2

[a] $\because x - y = 4 \qquad \therefore x = y + 4$ (1)

, $3x + 2y = 7$ (2)

Substituting from (1) in (2) :

$\therefore 3(y + 4) + 2y = 7 \qquad \therefore 3y + 12 + 2y = 7$

$\therefore 5y = -5 \qquad \therefore y = -1$

Substituting in (1) : $\therefore x = 3$

$\therefore$ The S.S. $= \{(3 , -1)\}$

[b] $\because n(x) = \frac{x^2 + x + 1}{x} \times \frac{x(x-1)}{(x-1)(x^2 + x + 1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 1\}$

, $n(x) = 1$

3

[a] $\because x^2 - 2x - 1 = 0$

$\therefore a = 1 \quad , \quad b = -2 \quad , \quad c = -1$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$

$\therefore x \approx 2.4$ or $x \approx -0.4$

$\therefore$ The S.S. $= \{2.4 , -0.4\}$

[b] $\because n(x) = \frac{x(x-3)}{(x-3)(x+3)} + \frac{x-1}{(x-1)(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 3 , -3\}$

, $n(x) = \frac{x}{x+3} + \frac{1}{x+3} = \frac{x+1}{x+3}$

4

[a] Let the length be x cm. and the width be y cm.

$\therefore x = y + 3$ (1)

, $xy = 28$ (2)

Substituting from (1) in (2) :

$\therefore (y+3)\,y = 28 \quad \therefore y^2 + 3y - 28 = 0$

$\therefore (y-4)(y+7) = 0$

$\therefore y = 4$ or $y = -7$ (refused)

Substituting in (1) : $\therefore x = 7$

$\therefore$ Its perimeter $= 2(7+4) = 22$ cm.

[b] $\because n_1(x) = \frac{x}{x(x-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 2\}$

, $n_1(x) = \frac{1}{x-2}$ } (1)

, $\because n_2(x) = \frac{x+1}{(x+1)(x-2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-1, 2\}$

, $n_2(x) = \frac{1}{x-2}$ } (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

5

[a] $\because z(f) = \{5\}$ $\quad\therefore$ at $x = 5$

$\therefore x^2 - 10x + a = 0 \quad \therefore (5)^2 - 10(5) + a = 0$

$\therefore 25 - 50 + a = 0 \quad \therefore -25 + a = 0$

$\therefore a = 25$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

3 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

21 Luxor

1

1 d 2 c 3 d 4 c 5 a 6 c

2

[a] $\because 3x + 4y = 11$ (1)

, $2x + y - 4 = 0 \quad \therefore y = 4 - 2x$ (2)

Substituting from (2) in (1) : $\therefore 3x + 4(4 - 2x) = 11$

$\therefore 3x + 16 - 8x = 11$

$\therefore -5x = -5 \quad \therefore x = 1$

Substituting in (2) : $\therefore y = 2$

$\therefore$ The S.S. $= \{(1, 2)\}$

[b] $\because n_1(x) = \frac{(x-2)(x+2)}{(x-2)(x+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2, -3\}$

, $n_1(x) = \frac{x+2}{x+3}$

, $\because n_2(x) = \frac{(x+2)(x-3)}{(x-3)(x+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3, -3\}$

, $n_2(x) = \frac{x+2}{x+3}$

$\therefore n_1(x) = n_2(x)$

For all the values of $x \in \mathbb{R} - \{2, 3, -3\}$

3

[a] $\because 3x^2 - 5x + 1 = 0$

$\therefore a = 3 \;,\; b = -5 \;,\; c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43$ or $x \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] $\because n(x) = \frac{x^2 + 2x + 4}{(x-2)(x^2 + 2x + 4)} + \frac{(x+3)(x-3)}{(x+3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

, $n(x) = \frac{1}{x-2} + \frac{x-3}{x-2} = \frac{x-2}{x-2} = 1$

4

[a] $\because n(x) = \frac{(x+4)(x+5)}{(x+4)(x-4)}$

$\therefore n^{-1}(x) = \frac{(x+4)(x-4)}{(x+4)(x+5)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{4, -4, -5\}$

, $n^{-1}(x) = \frac{x-4}{x+5}$

[b] Let the length be x cm.

and the width by y cm.

$\therefore x = y + 3$ (1)

, $xy = 28$ (2)

Substituting from (1) in (2) : $\therefore (y+3)\,y = 28$

$\therefore y^2 + 3y - 28 = 0$

$\therefore (y-4)(y+7)=0$

$\therefore y=4$ or $y=-7$ (refused)

Substituting in (1) : $\therefore x=7$

$\therefore$ Its perimeter $=2(7+4)=22$ cm.

5

[a] $\because n(x)=\frac{(x-1)(x^2+x+1)}{x(x-1)}\times\frac{x+3}{x^2+x+1}$

$\therefore$ The domain of $n=\mathbb{R}-\{0, 1\}$

, $n(x)=\frac{x+3}{x}$

[b] [1] $P(\acute{A})=1-P(A)=1-0.8=0.2$

[2] The probability of occurrence of at least one of the two events $=P(A\cup B)$

$=P(A)+P(B)-P(A\cap B)$

$=0.8+0.7-0.6=0.9$

[3] $P(A-B)=P(A)-P(A\cap B)=0.8-0.6=0.2$

22 Aswan

1

[1] c [2] d [3] a [4] b [5] c [6] b

2

[a] $\because x+y=7$ (1)

, $2x-y=5$ (2)

Adding (1) and (2) : $\therefore 3x=12$

$\therefore x=4$

Substituting in (1) : $\therefore y=3$

$\therefore$ The S.S. $=\{(4, 3)\}$

[b] $\because n(x)=\frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x)=\frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1}=\mathbb{R}-\{0, 1, 2\}$

, $n^{-1}(x)=\frac{x-1}{x}$

3

[a] $\because 2x^2-5x+1=0$

$\therefore a=2$, $b=-5$, $c=1$

$\therefore x=\frac{5\pm\sqrt{(-5)^2-4\times2\times1}}{2\times2}=\frac{5\pm\sqrt{17}}{4}$

$\therefore x\approx2.28$ or $x\approx0.22$

$\therefore$ The S.S. $=\{2.28, 0.22\}$

[b] $\because n(x)=\frac{(x-2)(x^2+2x+4)}{(x+3)(x-2)}\times\frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n=\mathbb{R}-\{2, -3\}$

, $n(x)=1$

4

[a] $\because x-y=0$ $\therefore x=y$ (1)

, $xy=9$ (2)

Substituting from (1) in (2) :

$\therefore y^2=9$ $\therefore y=3$ or $y=-3$

Substituting in (1) : $\therefore x=3$ or $x=-3$

$\therefore$ The S.S. $=\{(3, 3), (-3, -3)\}$

[b] $\because n(x)=\frac{x(x+1)}{(x-1)(x+1)}+\frac{x-5}{(x-1)(x-5)}$

$\therefore$ The domain of $n=\mathbb{R}-\{1, -1, 5\}$

, $n(x)=\frac{x}{x-1}+\frac{1}{x-1}=\frac{x+1}{x-1}$

5

[a] $\because n_1(x)=\frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-4\}$
, $n_1(x)=\frac{x}{x+4}$ } (1)

, $\because n_2(x)=\frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-4\}$
, $n_2(x)=\frac{x}{x+4}$ } (2)

From (1) and (2) : $\therefore n_1=n_2$

[b] [1] $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=0.5+0.3-0.7=0.1$

[2] $P(A-B)=P(A)-P(A\cap B)=0.5-0.1=0.4$

23 New Valley

1

[1] a [2] b [3] c [4] d [5] b [6] c

2

[a] $\because x^2 - 4x + 1 = 0$

$\therefore a = 1 \quad , \quad b = -4 \quad , \quad c = 1$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$

$\therefore x = 2 + \sqrt{3}$ or $x = 2 - \sqrt{3}$

[b] $\because n(x) = \frac{(x-3)(x-3)}{(x-2)(x-3)} + \frac{x^2 + 2x + 4}{(x-2)(x^2 + 2x + 4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, 3\}$

$, n(x) = \frac{x-3}{x-2} + \frac{1}{x-2} = \frac{x-2}{x-2} = 1$

3

[a] $\because y - x = 1 \qquad \therefore y = x + 1 \qquad (1)$

$, xy = 6 \qquad (2)$

Substituting from (1) in (2) :

$\therefore x(x+1) = 6 \qquad \therefore x^2 + x - 6 = 0$

$\therefore (x-2)(x+3) = 0$

$\therefore x = 2$ or $x = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -2$

$\therefore$ The S.S. $= \{(2, 3), (-3, -2)\}$

[b] $\because n(x) = \frac{x(x-3)}{(x-3)(x+3)} \div \frac{2x}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 3, -3\}$

$, n(x) = \frac{x(x-3)}{(x-3)(x+3)} \times \frac{x+3}{2x} = \frac{1}{2}$

4

[a] 1 $P(\acute{B}) = 1 - P(B) = 1 - 0.5 = 0.5$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

3 $P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$

[b] 1 $\because n^{-1}(x) = \frac{x-3}{x+2} \qquad \therefore n(x) = \frac{x+2}{x-3}$

$\therefore x - a = x + 2 \qquad \therefore a = -2$

2 $\because n(x) = \frac{x+2}{x-3}$, the domain of $n = \mathbb{R} - \{3\}$

$\therefore n(4) = \frac{4+2}{4-3} = 6$

5

[a] $\because n(x) = \frac{x^3 - 1 + x^2 - 1}{x - 1}$

$= \frac{(x-1)(x^2 + x + 1) + (x-1)(x+1)}{x-1}$

$= \frac{(x-1)(x^2 + x + 1 + x + 1)}{x-1}$

$= \frac{(x-1)(x^2 + 2x + 2)}{x-1}$

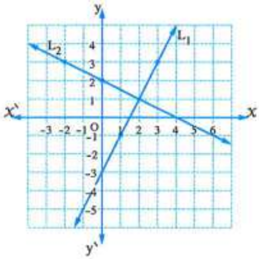
$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = x^2 + 2x + 2$

[b] $y = 2x - 3 \qquad , \qquad x = -2y + 4$

x	1	2	3
y	−1	1	3

x	−2	0	2
y	3	2	1



From the graph : $\therefore$ The S.S. $= \{(2, 1)\}$

24 South Sinai

1

1 c 2 a 3 b 4 d 5 a 6 b

2

[a] $\because x + y = 2 \qquad (1)$

$, x - y = 2 \qquad (2)$

Adding (1) and (2) : $\therefore 2x = 4 \qquad \therefore x = 2$

Substituting in (1) : $\therefore y = 0$

$\therefore$ The S.S. $= \{(2, 0)\}$

[b] $\because n(x) = \frac{(x-1)(x^2 + x + 1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2 + x + 1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] $\because x^2 - 5x + 1 = 0$

$\therefore a = 1 \quad , \quad b = -5 \quad , \quad c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{5 \pm \sqrt{21}}{2}$

$\therefore x \approx 4.8$ or $x \approx 0.2$

$\therefore$ The S.S. $= \{4.8 , 0.2\}$

[b] $\because n(x) = \frac{x}{x-2} - \frac{x}{x+2}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -2\}$

$, n(x) = \frac{x(x+2) - x(x-2)}{(x-2)(x+2)}$

$= \frac{x^2 + 2x - x^2 + 2x}{(x-2)(x+2)} = \frac{4x}{(x-2)(x+2)}$

4

[a] $\because x - y = 0 \qquad \therefore x = y$ (1)

$, x^2 + xy + y^2 = 27$ (2)

Substituting from (1) in (2) : $\therefore y^2 + y^2 + y^2 = 27$

$\therefore 3y^2 = 27 \qquad \therefore y^2 = 9$

$\therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3 , 3)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+3)(x-3)} \div \frac{2x}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , -3 , 3\}$

$, n(x) = \frac{x(x+2)}{(x+3)(x-3)} \times \frac{x+3}{2x} = \frac{x+2}{2(x-3)}$

5

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$
$, n_1(x) = \frac{x}{x+4}$ } (1)

$, \because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$
$, n_2(x) = \frac{x}{x+4}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(A \cap B) = \frac{2}{6} = \frac{1}{3}$

2 $P(A - B) = \frac{1}{6}$

3 The probability of non-occurrence of the event $A = P(\acute{A}) = \frac{3}{6} = \frac{1}{2}$

25 North Sinai

1

1 c 2 a 3 a 4 d 5 c 6 b

2

[a] $\because x^2 - 3x + 1 = 0$

$\therefore a = 1 , b = -3 , c = 1$

$\therefore x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{3 \pm \sqrt{5}}{2}$

$\therefore x \approx 2.62$ or $x \approx 0.38$

$\therefore$ The S.S. $= \{2.62 , 0.38\}$

[b] $\because n(x) = \frac{x}{x-3} + \frac{3(x+1)}{(x+1)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1 , 3\}$

$, n(x) = \frac{x}{x-3} + \frac{3}{x-3} = \frac{x+3}{x-3}$

3

[a] $\because n_1(x) = \frac{2x}{2(x-3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{3\}$
$, n_1(x) = \frac{x}{x-3}$ } (1)

$, \because n_2(x) = \frac{x(x-3)}{(x-3)(x-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3\}$
$, n_2(x) = \frac{x}{x-3}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - y = 1 \qquad \therefore x = y + 1$ (1)

$, xy = 12$ (2)

Substituting from (1) in (2) :

$\therefore (y+1)y = 12 \qquad \therefore y^2 + y - 12 = 0$

$\therefore (y-3)(y+4) = 0$

$\therefore y = 3$ or $y = -4$

Substituting in (1) : $\therefore x = 4$ or $x = -3$

$\therefore$ The S.S. $= \{(4 , 3) , (-3 , -4)\}$

4

[a] $\because n(x) = \frac{x(x-3)}{x(x-1)} \times \frac{(x-1)(x+2)}{(x-3)(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 1 , 3 , -3\}$

$, n(x) = \frac{x+2}{x+3}$

[b] $\because 2x + y = 5$ (1)

$, x - y = 7$ (2)

Adding (1) and (2) :

$\therefore 3x = 12$ $\therefore x = 4$

Substituting in (2) : $\therefore y = -3$

$\therefore$ The S.S. $= \{(4, -3)\}$

5

[a] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$, n^{-1}(x) = \frac{x-1}{x}$

[b] 1 $P(\grave{A}) = 1 - P(A) = 1 - 0.4 = 0.6$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.4 + 0.5 - 0.2 = 0.7$

3 $P(A - B) = P(A) - P(A \cap B) = 0.4 - 0.2 = 0.2$

26 Red Sea

1

1 c 2 a 3 c 4 b 5 d 6 a

2

[a] $\because 2x - y = 3$

Multiplying the two sides of equation by 2

$\therefore 4x - 2y = 6$ (1)

$, x + 2y = 4$ (2)

Adding (1) and (2) :

$\therefore 5x = 10$ $\therefore x = 2$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = 2$

3

[a] $\because n(x) = \frac{x(x+1)}{(x+1)(x-1)} + \frac{x-5}{(x-5)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1, 1, 5\}$

$, n(x) = \frac{x}{x-1} + \frac{1}{x-1} = \frac{x+1}{x-1}$

[b] $\because x^2 - 3x - 2 = 0$

$\therefore a = 1 \quad , \quad b = -3 \quad , \quad c = -2$

$\therefore x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{3 \pm \sqrt{17}}{2}$

$\therefore x = \frac{3+\sqrt{17}}{2}$ or $x = \frac{3-\sqrt{17}}{2}$

$\therefore$ The S.S. $= \left\{\frac{3+\sqrt{17}}{2}, \frac{3-\sqrt{17}}{2}\right\}$

4

[a] $\because x - y = 2$ $\therefore x = y + 2$ (1)

$, x^2 + y^2 = 10$ (2)

Substituting from (1) in (2) :

$\therefore (y+2)^2 + y^2 = 10$

$\therefore y^2 + 4y + 4 + y^2 - 10 = 0$

$\therefore 2y^2 + 4y - 6 = 0$ $\therefore y^2 + 2y - 3 = 0$

$\therefore (y+3)(y-1) = 0$ $\therefore y = -3$ or $y = 1$

Substituting in (1) : $\therefore x = -1$ or $x = 3$

$\therefore$ The S.S. $= \{(-1, -3), (3, 1)\}$

[b] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$
$, n_1(x) = \frac{x}{x+4}$ } (1)

$, \because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$
$, n_2(x) = \frac{x}{x+4}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x) = 3$ $\therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 + 2 = 3x$ $\therefore x^2 - 3x + 2 = 0$

$\therefore (x-1)(x-2) = 0$

$\therefore x = 1$ or

$x = 2$ (refused because $2 \notin$ the domain of n^{-1})

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{1}{3} - \frac{1}{8} = \frac{17}{24}$

2 $\because$ A , B are mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

27 Matrouh

1

1 c 2 b 3 b 4 a 5 c 6 c

2

[a] $\because n(x) = \frac{x^2+x+1}{x} \div \frac{(x-1)(x^2+x+1)}{x(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 1\}$

$, n(x) = \frac{x^2+x+1}{x} \times \frac{x(x-1)}{(x-1)(x^2+x+1)} = 1$

[b] $\because x^2 - 4x + 1 = 0$

$\therefore a = 1 \quad , \quad b = -4 \quad , \quad c = 1$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$

$\therefore x \approx 3.73$ or $x \approx 0.27$

$\therefore$ The S.S. $= \{3.73 , 0.27\}$

3

[a] $\because 2x - y = 5$

Multiplying the two sides of equation by 5

$\therefore 10x - 5y = 25$ (1)

$, x + 5y = 8$ (2)

Adding (1) and (2) :

$\therefore 11x = 33$ $\therefore x = 3$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(3 , 1)\}$

[b] $\because n_1(x) = \frac{x}{x+2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$ } (1)

$, \because n_2(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$, n_2(x) = \frac{x}{x+2}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because f(x) = (x-3)(x-5)$

$\therefore z(f) = \{3 , 5\}$

[b] $\because n(x) = \frac{x(x+1)}{(x+1)(x-1)} - \frac{x-5}{(x-1)(x-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 5 , -1\}$

$, n(x) = \frac{x}{x-1} - \frac{1}{x-1} = \frac{x-1}{x-1} = 1$

5

[a] $\because x - y = 1$ $\therefore x = y + 1$ (1)

$, x^2 + y^2 = 13$ (2)

Substituting from (1) in (2) :

$\therefore (y+1)^2 + y^2 = 13$

$\therefore y^2 + 2y + 1 + y^2 - 13 = 0$

$\therefore 2y^2 + 2y - 12 = 0$ $\therefore y^2 + y - 6 = 0$

$\therefore (y+3)(y-2) = 0$ $\therefore y = -3$ or $y = 2$

Substituting in (1) :

$\therefore x = -2$ or $x = 3$

$\therefore$ The S.S. $= \{(-2 , -3) , (3 , 2)\}$

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

1 $\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

2 $P(A - B) = P(A) = \frac{1}{2}$

Governorates' Examinations on Algebra and Probability

1 Cairo Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 The probability of the impossible event equals ....

(a) – 1 (b) zero. (c) $\frac{1}{2}$ (d) 1

2 $|-3|+|3|=$ ....

(a) – 6 (b) zero (c) 6 (d) 9

3 The number of solutions of the equation $x=7$ in $\mathbb{R}\times\mathbb{R}$ is ....

(a) infinite. (b) zero. (c) 1 (d) 2

4 If $\frac{1}{2}x=6$, then $\frac{1}{3}x=$ ....

(a) 1 (b) 2 (c) 3 (d) 4

5 If $n(x)=\frac{x-1}{x}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R}-\{0\}$ (c) $\mathbb{R}-\{0,1\}$ (d) $\mathbb{R}-\{1\}$

6 $\mathbb{R}_+\cap\mathbb{R}_-=$ ....

(a) $\mathbb{R}$ (b) $\varnothing$ (c) $\mathbb{R}-\{0\}$ (d) $\mathbb{R}_+\cup\mathbb{R}_-$

2 [a] If A and B are two events of the sample space of a random experiment where $P(A)=0.4$, $P(B)=0.5$, $P(A\cap B)=0.3$, **find :**

1 $P(\grave{A})$ 2 $P(A\cup B)$

[b] Find in $\mathbb{R}\times\mathbb{R}$ the solution set of the two equations : $x+y=2$, $y=x+2$

3 [a] Using the general formula , find in $\mathbb{R}$ the solution set for the equation : $x^2-x-1=0$ (approximating the result to the nearest one decimal place).

[b] Simplify n (x) to the simplest form showing the domain of n where :

$$n(x)=\frac{x-4}{x+7}\div\frac{x^2-16}{x^2+11x+28}$$

4 [a] If $n_1(x)=\frac{1}{x-2}$, $n_2(x)=\frac{x^2+2x+4}{x^3-8}$, **prove that :** $n_1=n_2$

[b] Find in $\mathbb{R}\times\mathbb{R}$ the solution set of the two equations : $x=y$ and $x^2+y^2=18$

5 **[a] Simplify n (X) to the simplest form showing the domain of n where :**

$$n(X) = \frac{X-5}{X^2-2X-15} + \frac{8}{2X+6}$$

[b] If $n(X) = \frac{X^2-25}{X^2-5X}$, reduce n ($X$) to its simplest form and show the domain of n

2 Giza Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $\sqrt{64+36} = 8 + X$, then $X =$ ....

(a) 2 (b) 6 (c) 9 (d) 10

2 If the two equations : $X + 4y = 7$ and $3X + ky = 21$ have an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 4 (b) 7 (c) 12 (d) 21

3 If $X + 3y = 7$, then $X + 3(y + 5) =$ ....

(a) 3 (b) 7 (c) 21 (d) 22

4 If $n(X) = \frac{X+2}{X-3}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-2, 3\}$

5 If $Xy = 12$, $yz = 20$, $Xz = 15$ where $X \in \mathbb{R}_+$, $y \in \mathbb{R}_+$, $z \in \mathbb{R}_+$, then $Xyz =$ ....

(a) ± 60 (b) 60 (c) 360 (d) ± 360

6 If A , B are two mutually exclusive events , then $A \cap B =$ ....

(a) zero (b) $\varnothing$ (c) 1 (d) S

2 **[a]** If A , B are two events from a sample space of a random experiment , $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, **find $P(A \cup B)$ if :**

1 $P(A \cap B) = \frac{1}{8}$

2 A , B are two mutually exclusive events.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $2X + y = 1$ and $X + 2y = 5$

3 **[a]** Use the general formula to find in $\mathbb{R}$ the solution set of the equation : $2X^2 - 5X + 1 = 0$ (approximate to one decimal place)

[b] Find n (X) in its simplest form and find the domain of n where :

$$n(X) = \frac{X^2+4X+3}{X^3-27} \div \frac{X+3}{X^2+3X+9}$$ Find n (2) , n (– 3) if it is possible.

4 **[a] Find n (X) in its simplest form and find the domain of n where :**

$n(X) = \frac{X}{X-4} - \frac{X+4}{X^2-16}$

[b] Find algebraically the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$:

$X - y = 1$, $X^2 + y^2 = 25$

5 [a] If $n_1(X) = \frac{X^2-4}{X^2+X-6}$, $n_2(X) = \frac{X^2-X-6}{X^2-9}$, show if $n_1 = n_2$ or not , giving reason.

[b] If $\{-3 , 3\}$ is the set of zeroes of the function $f : f(X) = X^2 + a$, then find a

3 Alexandria Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from those given :**

1 The arithmetic mean of the set of the values : 2 , 3 , 4 , 7 and 9 is ....

(a) 4 (b) 5 (c) 6 (d) 8

2 The set of zeroes of the function $f : f(X) = -3X$ in $\mathbb{R}$ is ....

(a) $\{0\}$ (b) $\{-3\}$ (c) $\{-3 , 0\}$ (d) $\mathbb{R}$

3 If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 5 (d) zero.

4 If $(5 , X - 7) = (y + 1 , -5)$, then $X + y$ = ...

(a) 6 (b) -6 (c) 2 (d) -2

5 If $\frac{1}{5} X = \frac{1}{10}$, then $2X$ = ...

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 50

6 If A and B are two mutually exclusive events from the sample space of a random experiment , then $A \cap B$ = ...

(a) zero. (b) $\varnothing$ (c) P (B) (d) P (A)

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$X - y = 0$, $X^2 + Xy + y^2 = 27$

[b] Find the common domain for n_1 and n_2 , where :

$n_1(X) = \frac{X^2+4}{X^2-4}$, $n_2(X) = \frac{7}{X^2+4X+4}$

3 **[a] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 4X + 1 = 0$, taking $\sqrt{3} \simeq 1.7$

[b] Find n (X) in its simplest form where :

$n(X) = \frac{X-3}{X^2-7X+12} + \frac{X-3}{3-X}$, showing the domain of n

4 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$3X + 2y = 7$, $X - y = 4$

[b] Find n (X) in its simplest form where :

$n(X) = \frac{X^2-X+1}{X} \times \frac{X^2+X}{X^3+1}$, showing the domain of n

5 [a] If $n(X) = \frac{X^2-4}{X^3-8}$, find $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}

[b] If A and B are two events from the sample space of a random experiment , and P (A) = 0.7 , P (A – B) = 0.5 , **find :** P (A ∩ B)

4 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer from the given ones :**

1 If $f(X) = \frac{X+2}{X-3}$, then the domain of f^{-1} is ....

(a) {3} (b) $\mathbb{R}$ – {– 2 , 3} (c) $\mathbb{R}$ – {– 2} (d) $\mathbb{R}$

2 The probability of the impossible event equals ....

(a) ∅ (b) 1 (c) zero. (d) – 1

3 The set of zeroes of the function f where $f(X) = X + 3$ in $\mathbb{R}$ is ....

(a) ∅ (b) {3} (c) {zero} (d) {– 3}

4 If A ⊂ B , then P (A ∪ B) = ...

(a) P (A) (b) P (B) (c) P (A ∩ B) (d) zero.

5 The two straight lines : $3X + 5y = 0$, $5X - 3y = 0$ are intersecting in the ....

(a) first quadrant. (b) second quadrant. (c) third quadrant (d) origin point.

6 The solution set of the two equations : $X = 1$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) {(1 , 3)} (b) {(3 , 1)} (c) $\mathbb{R}$ (d) ∅

2 **[a] Simplify :** $n(X) = \frac{X^2-49}{X^3-8} \div \frac{X+7}{X-2}$, showing the domain of n

[b] Find in $\mathbb{R}$ the solution set of the equation : $3X^2 - 5X + 1 = 0$ by using the general formula and round the results to two decimals.

3 **[a] Solve in $\mathbb{R} \times \mathbb{R}$:** $X + 3y = 7$, $5X - y = 3$

[b] If $f_1(X) = \frac{X}{X+2}$ and $f_2(X) = \frac{2X}{2X+4}$ **, then prove that :** $f_1 = f_2$

4 **[a] Simplify :** $f(X) = \frac{X^2 + 2X}{X^2 - 4} + \frac{X - 3}{X^2 - 5X + 6}$, showing the domain of f

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $X - 3 = 0$, $X^2 + y^2 = 25$

5 **[a]** If A , B are two mutually exclusive events of a random experiment and P (A) = 0.3 , P (B) = 0.6 **, find :**

1. $P(A \cup B)$
2. $P(\grave{A})$

[b] If the curve of the function f where $f(X) = X^2 - a$ passes through the point (1 , 0) , find the value of a

5 El-Sharkia Governorate

Answer the following questions : *(Using calculator is permitted)*

1 **Choose the correct answer :**

1. The number of solutions of the two equations : $2X - 3y = 5$ and $2X - 3y = 7$ together in $\mathbb{R} \times \mathbb{R}$ is ....

   (a) zero (b) 1 (c) 2 (d) an infinite number.

2. The solution set of the two equations : y = 3 , $X = 2$ in $\mathbb{R} \times \mathbb{R}$ is ....

   (a) $\{(3 , -2)\}$ (b) $\{(-2 , 3)\}$ (c) $\{(2 , 3)\}$ (d) $\{(3 , 2)\}$

3. If $P(A) = \frac{1}{2} P(\grave{A})$, then P (A) = ... where A is an event from the sample space of a random experiment.

   (a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1

4. If $n(X) = \frac{X}{X^2 + 1}$, then the domain of n^{-1} is ....

   (a) $\mathbb{R} - \{0\}$ (b) $\varnothing$ (c) $\mathbb{R} - \{-1\}$ (d) $\mathbb{R} - \{1 , -1\}$

5. If the curve of the quadratic function f passes through the points (4 , 0) , (0 , – 8) , (– 2 , 0) , then the solution set of the equation $f(X)$ = zero in $\mathbb{R}$ is ....

   (a) $\{4 , 0\}$ (b) $\{8 , 0\}$ (c) $\{-2 , 4\}$ (d) $\{2 , 8\}$

6. If $\{-2 , 2\}$ is the set of zeroes of the function f where $f(X) = X^2 + a$, then a = ...

   (a) 2 (b) – 2 (c) 4 (d) – 4

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 4 \quad , \quad 3x + y = 8$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x}{x+4} - \frac{x-4}{x^2-16}$

3 [a] By using the general formula , find the solution set of the following equation in $\mathbb{R}$:

$x^2 + 3x - 3 = \text{zero}$ (approximating the result to nearest 3 decimal digits).

[b] If $n(x) = \frac{1}{x^2-1} \div \frac{1}{x+1}$, find n (x) in the simplest form showing the domain.

4 [a] If A , B are two events in the sample space of a random experiment and

$P(A) = 0.3 \quad , \quad P(B) = 0.6 \quad , \quad P(A \cap B) = 0.2$, **find :**

1 $P(A \cup B)$

2 $P(A - B)$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 4 \quad , \quad x^2 + y^2 = 10$

5 [a] **Find n (x) in the simplest form showing the domain where :**

$n(x) = \frac{x^2+x+1}{x^3-1} \times \frac{x^2+2x}{x^2-4}$

[b] If the domain of the function n where $n(x) = \frac{x+1}{x^2 - ax + 4}$ is $\mathbb{R} - \{2\}$

, find the value of : a

6 El-Monofia Governorate

Answer the following questions : ***(Using calculator is permitted)***

1 **Choose the correct answer :**

1 If x is the additive identity , y is the multiplicative identity , then $(7)^x + (2)^y =$ ....

(a) 2 (b) 3 (c) 7 (d) 9

2 If $\frac{1}{2}x = 6$, then $\frac{1}{3}x =$ ....

(a) 2 (b) 3 (c) 4 (d) 6

3 The solution set of the inequality : $x < 2$ in $\mathbb{R}$ is ....

(a) $[2 , \infty[$ (b) $]2 , \infty[$ (c) $]-\infty , 2[$ (d) $]-\infty , 2]$

4 The intersection point of the two straight lines : $x = 1$, $y - 3 = 0$ lies in .... quadrant.

(a) the first (b) the second (c) the third (d) the fourth

5 The set of zeros of the function $f : f(X) = 7$ is ....

(a) $\varnothing$ (b) $\{7\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{7\}$

6 If A and B are two mutually exclusive events in the sample space of a random experiment , then $P(A \cap B) =$ ....

(a) $\frac{1}{2}$ (b) 1 (c) $\varnothing$ (d) zero.

---

2 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2X + y = 1 \quad , \quad X + 2y = 5$

[b] **Find n (X) in the simplest form showing the domain of n such that :**

$n(X) = \frac{5}{X-3} + \frac{4}{3-X}$

---

3 [a] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :**

$2X^2 - 5X + 1 = 0$ (rounding the result to the nearest two decimal places).

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$ **, find :**

1 $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

2 $n^{-1}(2)$ if it is possible.

---

4 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X - y = 0 \quad , \quad Xy = 9$

[b] **Find n (X) in the simplest form showing the domain of n such that :**

$n(X) = \frac{X^2}{X^2 - 3X} \div \frac{3X}{X^2 - 9}$

---

5 [a] If $n_1(X) = \frac{X^2}{X^3 - X^2}$ and $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$ **, prove that :** $n_1 = n_2$

[b] If A and B are two events from a sample space of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$ and $P(A \cap B) = 0.2$ **, find each of the following :**

1 $P(\acute{A})$ 2 $P(A \cup B)$ 3 $P(A - B)$

7 El-Gharbia Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If A and B are mutually exclusive events from the sample space of a random experiment , then $(A \cap B) =$ ....

(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\varnothing$

2 If five times a number equals 45 , then one ninth of this number equals ....

(a) 1 (b) 5 (c) 9 (d) 81

3 If the expression : $x^2 + k\,x + 36$ is a perfect square , then k = ...

(a) ± 6 (b) ± 8 (c) ± 12 (d) ± 18

4 The set of zeroes of $f : f(x) = 2\,x$ is ....

(a) $\{0\}$ (b) $\{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{2\}$

5 If $x^3 = 64$, then $\sqrt{x} =$ ....

(a) 2 (b) ± 2 (c) 4 (d) ± 8

6 The number of solutions of the two equations : $x + y = 7$, $y + x = 15$ simultaneous in $\mathbb{R} \times \mathbb{R}$ is ....

(a) ∅ (b) 1 (c) infinite. (d) 0

2 [a] By using the general rule find in $\mathbb{R}$ the solution set of the following equation : $x^2 - 4\,x + 2 = 0$ (rounding the results to one decimal place).

[b] Find n (x) in the simplest form showing the domain of n where :

$n(x) = \dfrac{x^3 - 8}{x^2 - 3\,x + 2} \times \dfrac{x + 1}{x^2 + 2\,x + 4}$ and find n (2)

3 [a] If $n(x) = \dfrac{x^2 - 2\,x}{x^2 - 4}$, find $n^{-1}(x)$ in the simplest form showing the domain of n^{-1} and if $n^{-1}(x) = 3$, what is the value of x ?

[b] Find the solution set of the two simultaneous equations in $\mathbb{R} \times \mathbb{R}$ algebraically :

$x + y = 4$, $2\,x - y = 2$

4 **[a] Find the solution set of the two simultaneous equations in $\mathbb{R} \times \mathbb{R}$ algebraically :**

$x + y = 5$, $x^2 - y^2 = 55$

[b] If $n_1(x) = \dfrac{2\,x}{2\,x + 4}$, $n_2(x) = \dfrac{x^2 + 2\,x}{x^2 + 4\,x + 4}$, **prove that :** $n_1 = n_2$

5 **[a] Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \dfrac{x^2 - x}{x^2 - 1} + \dfrac{x - 3}{x^2 - 2\,x - 3}$

[b] If A and B are two events in a sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, **find :**

1 $P(A \cup B)$

2 $P(\grave{A})$

8 El-Dakahlia Governorate

Answer the following questions : (Calculators are allowed)

1 **[a] Choose the correct answer from those given :**

1 The equation : $3x + 4y + xy = 5$ is of the .... degree.

(a) first (b) second (c) third (d) fourth

2 The two straight lines : $3x + 5y = 0$, $5x - 3y = 0$ intersect at the point ....

(a) (0 , 0) (b) (– 5 , 3) (c) (3 , 5) (d) (– 3 , – 5)

3 If $n(x) = \frac{x-2}{x+1}$, then $n^{-1}(2) =$ ....

(a) 0 (b) 2 (c) 3 (d) undefined.

[b] Find the solution set of the equation : $x(x-1) = 4$ in $\mathbb{R}$ by using the general formula rounding the results to one decimal place.

2 **[a] Choose the correct answer from those given :**

1 If $xy = 3$, $xy^2 = 12$, then $y =$ ....

(a) 4 (b) 2 (c) – 2 (d) ± 2

2 If A , B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) 1 (c) 0.5 (d) 0

3 The domain of the function $f : f(x) = x^2 - 4$ is ....

(a) $\mathbb{R} - \{2 , -2\}$ (b) $\{2 , -2\}$ (c) $\mathbb{R}$ (d) $\varnothing$

[b] If $n_1(x) = \frac{2x}{2x+8}$, $n_2(x) = \frac{x^2+4x}{x^2+8x+16}$ **, then prove that :** $n_1 = n_2$

3 **[a]** If the domain of the function $n : n(x) = \frac{b}{x} + \frac{9}{x-a}$ is $\mathbb{R} - \{0 , 4\}$, $n(5) = 2$, find the values of a , b

[b] Two acute angles in a right-angled triangle. The difference between their measures is 50° , find the measure of each angle.

4 **[a] Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2} - \frac{4 - x^2}{x^2 + x - 2}$$

[b] Find the solution set of the two equations :

$y + 2x = 7$, $(y + 2x - 8)^2 + x^2 = 5$ in $\mathbb{R} \times \mathbb{R}$

5 **[a] Find n (x) in the simplest form showing the domain of n , where :**

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$

[b] If A and B are two events in a sample space S of a random experiment and P (A) = 0.5 , P (B) = 0.4 and P (A ∩ B) = 0.1 **, find :**

1 P (A ∪ B)

2 P (A − B)

9 Ismailia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 If $|x| = 7$, then $x =$ ....

(a) − 7 (b) 7 (c) ± 7 (d) 14

2 The two straight lines : $x + 2y = 1$, $2x + 4y = 6$ are ....

(a) parallel.

(b) intersecting.

(c) perpendicular.

(d) intersecting and perpendicular.

3 The set of zeroes of the function f where $f(x)$ = zero is ....

(a) $\mathbb{R} - \{\text{zero}\}$ (b) $\varnothing$ (c) $\{\text{zero}\}$ (d) $\mathbb{R}$

4 The number of solutions of the equation : $x = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero. (b) 1 (c) 2 (d) an infinite number.

5 The domain of the function n : $n(x) = \frac{x}{x^2 - 1}$ is ....

(a) $\{-1\}$ (b) $\mathbb{R} - \{1\}$ (c) $\{-1 , 1\}$ (d) $\mathbb{R} - \{1 , -1\}$

6 If A is an event of a patient's recovery from corona virus and P (A) = 0.95 , then P (Ã) = ...

(a) 0.5 (b) 0.05 (c) 0.1 (d) 5

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**

$x - 3 = 0$, $x^2 + y^2 = 25$

[b] Find n (x) in the simplest form showing the domain of n :

$$n(x) = \frac{x}{x - 2} - \frac{2x + 4}{x^2 - 4}$$

3 [a] If $n_1(X) = \frac{X^2 + X - 6}{X^2 - 4}$, $n_2(X) = \frac{X^2 - 9}{X^2 - X - 6}$

, show whether $n_1 = n_2$ or not (give a reason)

[b] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$2X^2 - 5X + 1 = 0$ (rounding the results to two decimal places)

4 [a] **Find n (X) in the simplest form , showing the domain of n :**

$n(X) = \frac{X + 2}{X^2 - 4} \times \frac{2X - 4}{X - 3}$

[b] If A , B are two mutually exclusive events from the sample space of a random experiment , and P (A) = 0.2 , P (B) = 0.5 , **find :**

1 $P(A \cup B)$

2 $P(A - B)$

5 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50° , find the measure of each angle.

[b] **Find n (X) in the simplest form showing the domain of n :**

$n(X) = \frac{X^2 + 2X}{X^2 - 9} \div \frac{2X}{X + 3}$

10 Suez Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The set of zeroes of f where $f(X) = X^2 - 4$ is ....

(a) $\{2 , -2\}$ (b) $\mathbb{R} - \{2 , -2\}$ (c) $(2 , -2)$ (d) $\{4\}$

2 If n (X) = 5 , then n (2) = ...

(a) 3 (b) – 3 (c) 5 (d) 2

3 The solution set of the two equations : $X = 2$, $y = 5$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 5)\}$ (b) $(5 , 2)$ (c) $\mathbb{R}$ (d) $\varnothing$

4 $\sqrt[3]{64}$ = ...

(a) 4 (b) 8 (c) 2 (d) 6

5 The probability of the impossible event is ....

(a) – 1 (b) zero (c) 0.56 (d) 1

6 If a + b = 5 , a – b = 3 , then $a^2 - b^2$ = ...

(a) 8 (b) 9 (c) 15 (d) 25

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + y = 4$, $x - y = 2$**

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x(x-1)}{x^2-1} + \frac{x+5}{x^2+6x+5}$$

3 **[a] Find the solution set for the following equation by using the general formula in $\mathbb{R}$:**

$x^2 - 3x + 1 = 0$ (where $\sqrt{5} \simeq 2.24$)

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2+2x}{x^2-4} \times \frac{x-2}{x+3}$$

4 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 0$, $x^2 + y^2 = 32$

[b] If $n(x) = \frac{x+3}{x^2-9}$, find $n^{-1}(x)$ and identify the domain of n^{-1}

5 [a] If A and B are two events from the sample space of a random experiment and :

$P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, **find :** $P(A \cup B)$

[b] If $n_1(x) = \frac{x}{x+2}$, $n_2(x) = \frac{2x}{2x+4}$, **prove that :** $n_1 = n_2$

11 Port Said Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The S.S. of the two equations: $x = 2$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 3)\}$ (b) $\{(3 , 2)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

2 The set of zeroes of the function f where $f(x) = x + 4$ in $\mathbb{R}$ is ....

(a) $\{4 , -4\}$ (b) $\mathbb{R}$ (c) $\{-4\}$ (d) $\varnothing$

3 If A and B are mutually exclusive events from the sample space , then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) 1 (c) zero. (d) 0.5

4 The S.S. of the two equations : $x = 3$, $x y = 15$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{5\}$ (b) $\{3 , 5\}$ (c) $\{(5 , 3)\}$ (d) $\{(3 , 5)\}$

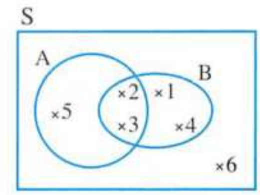
5 The domain of the additive inverse of the function $f : f(x) = \frac{x-2}{x-5}$ is ....

(a) $\mathbb{R} - \{2 , 5\}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{5\}$ (d) $\{2 , 5\}$

6 **In the opposite figure :**

A , B are two events subsets of S

, then P (A – B) = ...



(a) $\frac{1}{6}$ (b) $\frac{2}{6}$

(c) $\frac{4}{6}$ (d) 1

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $X + y = 4$, $2X - y = 2$

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 5X + 6}$

, then find $n^{-1}(X)$ in its simplest form showing the domain of n^{-1}

3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X - 1 = 0$, $X^2 + y^2 = 10$

[b] If $n_1(X) = \frac{1}{X + 1}$, $n_2(X) = \frac{X^2 - X + 1}{X^3 + 1}$ **, prove that :** $n_1 = n_2$

4 **[a] By using the general law find in $\mathbb{R}$ the S.S. of the equation :** $X^2 - X - 4 = 0$

[b] Find n (X) in the simplest form showing the domain of n :

$n(X) = \frac{X}{X^2 + 2X} + \frac{X - 2}{X^2 - 4}$

5 **[a] Find n (X) in the simplest form showing the domain of n :**

$n(X) = \frac{X^2 + 2X + 1}{2X - 8} \times \frac{X - 4}{X + 1}$

[b] A , B are two events of the sample space S and P (A) = 0.3 , P (B) = 0.6 , P (A ∩ B) = 0.2

Find : 1 P (À) 2 P (A ∪ B)

12 Damietta Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from the given ones :**

1 $\sqrt[3]{27} =$ ....

(a) 81 (b) 49 (c) 9 (d) 3

2 The set of zeroes of $f : f(X) = -3X$ is ....

(a) {0} (b) {– 3} (c) {– 3 , 0} (d) ∅

3 If $(5, X+1) = (y, 3)$, then $X + y =$ ....

(a) 3 (b) 5 (c) 7 (d) 9

4 The two straight lines : $X + 2 = 0$ and $y = X$ are intersecting at the point ....

(a) $(2, 2)$ (b) $(2, 0)$ (c) $(-2, -2)$ (d) $(0, 0)$

5 If $2^3 \times 5^3 = 10^X$, then $X =$ ....

(a) zero. (b) 3 (c) 6 (d) 9

6 If A and B are two mutually exclusive events of the sample space S, then $P(A \cap B) =$ ....

(a) zero. (b) 1 (c) $P(A)$ (d) $P(A \cup B)$

2 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2X - y = 3$, $X + 2y = 4$

[b] **Find n (X) in the simplest form, showing the domain of n where :**

$$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} + \frac{X^2 - 9}{X^2 + X - 6}$$

3 [a] **Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations :**

$y - X = 2$, $Xy = 3$

[b] **Find n (X) in the simplest form, showing the domain of n :**

$$n(X) = \frac{X^2 + 2X + 1}{2X - 8} \times \frac{X - 4}{X + 1}$$

4 [a] **By using the general formula, find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 5X + 3 = 0$ (approximating the results to one decimal place).

[b] If $n(X) = \frac{X - 2}{X + 1}$, **find :**

1 The domain of n^{-1} 2 $n^{-1}(3)$

5 [a] If $n_1(X) = \frac{1}{X}$, $n_2(X) = \frac{X^2 + 4}{X^3 + 4X}$

, **prove that :** $n_1 = n_2$

[b] If A and B are two events in the sample space of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$, **find the value of :**

1 $P(A \cup B)$ 2 $P(A - B)$

13 Kafr El-Sheikh Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 The equation of the symmetry axis of the curve of the function f where $f(X) = X^2 - 4$ is ....

(a) $X = -4$ (b) $X = 0$ (c) $y = 0$ (d) $y = -4$

2 The set of zeroes of the function f , where $f(X) = X^2 + 4$ in $\mathbb{R}$ is ....

(a) $\{2\}$ (b) $\{2 , -2\}$ (c) $\mathbb{R}$ (d) $\varnothing$

3 If $|X| = 7$, then $X =$ ....

(a) 7 (b) -7 (c) ± 7 (d) 14

4 As throwing a fair dice once , the probability of appearting a prime odd number is ....

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{4}$

5 If $5^{X-3} = 1$, then $X =$ ....

(a) 1 (b) 5 (c) 0 (d) 3

6 Half of the number 4^6 is ....

(a) 2^3 (b) 2^6 (c) 4^3 (d) 2^{11}

2 [a] **Find the solution set of the two equations :** $X - y = 1$, $X^2 + y^2 = 25$ in $\mathbb{R} \times \mathbb{R}$

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$, then find $n^{-1}(X)$ in the simplest form showing the domain of n

3 [a] **Using the general rule , find in $\mathbb{R}$ the solution set of the equation :**

$3X^2 - 5X + 1 = 0$, rounding the result to two decimal places.

[b] **Find n (X) in the simplest form showing the domain of n :**

$$n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$$

4 [a] If $n_1(X) = \frac{X^2}{X^3 - X^2}$ and $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, **prove that :** $n_1 = n_2$

[b] If A , B are two events of a random experiment and P (A) = 0.3 , P (B) = 0.6 , $P(A \cap B) = 0.2$, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

5 **[a] Find n (X) in the simplest form showing the domain of n :** $n(X) = \frac{X^2}{X-1} + \frac{X}{1-X}$

[b] Find algebraically the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$:

$X + y = 5 \quad , \quad X - y = 1$

14 El-Beheira Governorate

Answer the following questions : *(Calculator is permitted)*

1 **Choose the correct answer from the given ones :**

1. The number of solutions of the two equations : $X + y = 1$ and $y + X = 2$ together in $\mathbb{R} \times \mathbb{R}$ is ....

   (a) zero. (b) 1 (c) 2 (d) 3

2. If $\sqrt{64 + 36} = 8 + X$, then $X =$ ....

   (a) 2 (b) 6 (c) 9 (d) 10

3. The domain of the multiplicative inverse of the function n : $n(X) = \frac{X+2}{X-3}$ is ....

   (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-2 , 3\}$ (d) $\mathbb{R}$

4. If $3a = \sqrt{4}\, b$, then $\frac{a}{b} =$ ....

   (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$

5. If A and B are two mutually exclusive events and $P(A) = 0.5$, $P(A \cup B) = 0.8$, then $P(B) =$ ....

   (a) zero. (b) 0.3 (c) 0.5 (d) 0.6

6. The degree of the equation : $3X + 4y + Xy = 5$ is ....

   (a) zero. (b) first. (c) second. (d) third.

2 **[a] Find the solution set of the two equations :** $X + y = 5 \quad , \quad X - y = 7$ in $\mathbb{R} \times \mathbb{R}$

[b] Find n (X) in the simplest form showing the domain of n :

$n(X) = \frac{X-3}{X^2 - 7X + 12} - \frac{4}{X-4}$

3 **[a] Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$:**

$X + y = 3 \quad , \quad X^2 + y^2 = 5$

[b] Find n (X) in the simplest form showing the domain of n :

$n(X) = \frac{X^2 - 8X + 12}{X^2 - 4X + 4} + \frac{X^2 - 4X - 5}{X^2 - 7X + 10}$

4 [a] **Solve in $\mathbb{R}$ the equation :** $3x^2 - 5x - 4 = 0$ approximating to the nearest two decimals.

[b] **Prove that :** $n_1 = n_2$ where $n_1(x) = \frac{2x}{2x+8}$, $n_2(x) = \frac{x^2+4x}{x^2+8x+16}$

5 [a] **Find n (x) in the simplest form , showing the domain of n :**

$n(x) = \frac{x^3-1}{x^2-2x+1} \times \frac{2x-2}{x^2+x+1}$

[b] If A and B are two events from a sample space of random experiment and $P(A) = 0.6$, $P(B) = 0.7$, $P(A \cap B) = 0.4$, **find :**

1 $P(\grave{A})$ 2 $P(A \cup B)$ 3 $P(A - B)$

15 El-Fayoum Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 The solution set of the two equations : $y - 3 = 2$, $x + y = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(0, 5)\}$ (b) $\{(5, 0)\}$ (c) $\{(5, -5)\}$ (d) $\{(-5, 5)\}$

2 The domain of f : $f(x) = \frac{x+1}{(x-2)^7}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{2, 7\}$ (d) $\mathbb{R} - \{5\}$

3 The middle proportional between 9 and 16 is ....

(a) ± 12 (b) ± 9 (c) ± 16 (d) ± 25

4 If A is an event of the sample space (S) and $P(A) = \frac{3}{4}$, then $P(\grave{A}) =$ ....

(a) 0.25 (b) 0.75 (c) 0.40 (d) 0.50

5 If $x^3 y^{-3} = 27$, then $\frac{y}{x} =$ ....

(a) 27 (b) $\frac{1}{27}$ (c) $\frac{1}{3}$ (d) 3

6 If $3x = 45$, then $\frac{1}{5}x =$ ....

(a) 3 (b) 5 (c) 15 (d) 45

2 [a] **Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x(x-5) = 7$, approximating the result to one decimal place.

[b] Two positive numbers one of them is twice the other and their product is 72 , find the two numbers.

3 [a] **Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{x^2 - 3x}{x^2 - 5x + 6} - \frac{2x + 4}{x^2 - 4}$$

[b] If $f(x) = \frac{x^2 + 2x}{x^3 + 8}$, find $f^{-1}(x)$ in the simplest form , showing its domain.

And if : $f^{-1}(x) = 2$, find the value of x

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $2x + y = 5$, $x - y = 4$

[b] If the domain of the function n : $n(x) = \frac{x - 5}{2x - b}$ is $\mathbb{R} - \{3\}$, find the value of b

5 [a] **Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{x^2 - 3x + 9}{x^2 - 1} \div \frac{x^3 + 27}{x^2 + 4x + 3}$$

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.5$, $P(B) = 0.3$, $P(A \cup B) = 0.7$, **then find :** $P(A \cap B)$ and $P(A - B)$

16 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1. The algebraic expression : $3x^2 + 2x^2 y^2$ is of the .... degree.

   (a) first (b) second (c) third (d) fourth

2. If $5^x = 1$, then $5^{x-1} =$ ....

   (a) -1 (b) $\frac{1}{5}$ (c) 1 (d) 5

3. If there is an infinite number of solutions of the two equations : $x + 4y = 7$ and $3x + ky = 21$ in $\mathbb{R} \times \mathbb{R}$, then k = ...

   (a) 4 (b) 7 (c) 12 (d) 21

4. If $ab = 3$, $ab^2 = 12$, then b = ...

   (a) 4 (b) 2 (c) -2 (d) -4

5. If S is the sample space of a random experiment , $A \subset S$ and $P(A) + P(\grave{A}) = 3m$, then m = ...

   (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

6. If the algebraic fraction $\frac{x - a}{x - 2}$ has a multiplicative inverse which is $\frac{x - 2}{x + 3}$, then a = ...

   (a) -3 (b) -2 (c) 2 (d) 3

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $y - 3x = \text{zero}$ and $x^2 + xy = 4$

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$$

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3 **[a] Find in $\mathbb{R}$ by using the general formula the solution set of the equation :** $x^2 - 4x = 1$ rounding the result to one decimal place.

[b] If $n_1(x) = \frac{2x}{2x + 8}$ and $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$, **prove that :** $n_1 = n_2$

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4 **[a] Find in $\mathbb{R}$ the set of zeroes of the function f :** $f(x) = x^3 + x^2 - 20x$

[b] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$2x - y = 3$ and $x + 2y = 4$

---

5 **[a] Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \frac{x^3 + 8}{x^2 - 4} \times \frac{x - 2}{x^2 - 2x + 4}$, then find n (3), n (2) if it is possible.

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.5$, $P(A \cap B) = 0.2$, $P(A \cup B) = 0.9$, **find :** $P(B)$, $P(A - B)$

17 El-Menia Governorate

Answer the following questions : *(Calculators are allowed)t*

1 **Choose the correct answer :**

1. If $x - y = 3$, $x + y = 5$, then $x^2 - y^2 =$ ....
   (a) 15 (b) 16 (c) 17 (d) 18
2. The domain of the function $f : f(x) = \frac{x}{x - 1}$ is ....
   (a) $\{1\}$ (b) $\{-1\}$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R} - \{-1\}$
3. The S.S. of the two equations : $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $\{3, 4\}$ (b) $\{(3, 4)\}$ (c) $\{(4, 3)\}$ (d) $\varnothing$
4. If $(x, 6) = (5, y)$, then $x + y =$ ....
   (a) 6 (b) 5 (c) 11 (d) 30
5. The set of zeroes of the function $f : f(x) = 4$ is ....
   (a) zero. (b) $\{4\}$ (c) $\{0, 4\}$ (d) $\varnothing$
6. The probability of the impossible event equals ....
   (a) $\varnothing$ (b) zero. (c) 1 (d) -1

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $X - 3 = 0$, $X^2 + y^2 = 25$

[b] **Find n (X) in the simplest form showing the domain of n :** $n(X) = \frac{X}{X+2} + \frac{2X-4}{X^2-4}$

3 [a] **Find n (X) in the simplest form showing the domain of n :**

$n(X) = \frac{X^3-1}{X^2-X} \times \frac{X}{X^2+X+1}$

[b] **Find S.S. of the two equations in $\mathbb{R} \times \mathbb{R}$:** $2X - y = 3$, $X + 2y = 4$

4 [a] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2+2X}{X^2+4X+4}$, **prove that :** $n_1 = n_2$

[b] **Find in $\mathbb{R}$ the S.S. of the equation by using the general formula :** $X^2 + 2X + 1 = 0$

5 [a] If A and B are two events in the sample space of a random experiment , $P(B) = 0.5$, $P(A \cap B) = 0.3$, $P(A) = 0.7$, **find :** $P(A \cup B)$, $P(A - B)$

[b] If $n(X) = \frac{X}{X+3}$, **find :** $n^{-1}(X)$, showing the domain of n^{-1}

18 Assiut Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1. $\sqrt{9+16} = \dots\dots + 4$

 (a) 5 (b) 3 (c) 1 (d) zero.

2. The two straight lines : $2X + 3y = 0$, $5X - 3y = 0$ are intersecting in the ……

 (a) first quadrant. (b) second quadrant. (c) third quadrant. (d) origin point.

3. Half of the number 2^6 is ……

 (a) 2^3 (b) 2^6 (c) 2^5 (d) 2^{11}

4. If $X \neq$ zero , then $\frac{3X}{X^2+1} \div \frac{X}{X^2+1} = \dots\dots$

 (a) zero. (b) 1 (c) 2 (d) 3

5. If A , B are two mutually exclusive events of a random experiment , then $A \cap B = \dots\dots$

 (a) zero. (b) 0.5 (c) 1 (d) $\varnothing$

6. If $ab^{20} = 40$, $ab^{19} = 20$, where a , b ≠ zero , then b = ……

 (a) 1 (b) 2 (c) 3 (d) 4

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$, $x y = 9$

[b] **Find n (x) in the simplest form showing the domain of n :**

$$n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x - 1}{x^2 + 2x - 3}$$

3 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $3x^2 - 5x + 1 = 0$, by using the general formula , rounding the results to two decimal places.

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^2 + x + 1}{x^3 - 1}$

, **prove that :** $n_1(x) = n_2(x)$ for all values of x which belong to the common domain and find this domain.

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 3$, $2x + y = 9$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$, **find :**

1 $n^{-1}(x)$ in the simplest form and identify the domain of n^{-1}

2 The value of x , if $n^{-1}(x) = 3$

5 [a] If A , B are two events from the sample space of a random experiment.
where P (A) = 0.3 , P (B) = 0.6 , $P(A \cap B) = 0.2$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$ 3 $P(\grave{B})$

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 4x + 4} \times \frac{2x - 4}{x^2 + 2x + 4}$, **find :**

1 n (x) in the simplest form showing the domain of n

2 The value of n (2)

19 Souhag Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from the given ones :**

1 The set of zeroes of the function f where $f(x) = x - 5$ in $\mathbb{R}$ is ....

(a) $\mathbb{R}$ (b) $\{-5\}$ (c) $\{5\}$ (d) $\varnothing$

2 If $2^{k-3} = 1$, then k = ...

(a) zero. (b) 3 (c) – 3 (d) 8

3 If the two events A , B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B)$ = ...

(a) $\varnothing$ (b) zero. (c) 1 (d) 2

4 The solution set of the equation : $x^2 + 9 = 0$ in $\mathbb{R}$ is ....

(a) $\{3\}$ (b) $\{-3\}$ (c) $\{3, -3\}$ (d) $\varnothing$

5 If $2^5 \times 3^5 = 6^m$, then m = ...

(a) 5 (b) 6 (c) 10 (d) 25

6 If there is an infinite number of solutions of the equations : $x + 6y = 3$, $2x + ky = 6$ in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 4 (b) 6 (c) 12 (d) 21

2 [a] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :**

$x^2 - 2x - 4 = 0$ rounding the result to the nearest two decimal digits.

[b] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$, **prove that :** $n_1 = n_2$

3 [a] **Find the solution set of the two equations :** $y = 3 - x$ and $xy = 2$ in $\mathbb{R} \times \mathbb{R}$

[b] If : $n(x) = \frac{x - 2}{x + 1}$, **find :**

1 $n^{-1}(x)$ and identify the domain of n^{-1} 2 $n^{-1}(3)$

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$2x - y = 7$, $x + y = 5$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$

5 [a] **Find n (x) in the simplest form , showing the domain of n where** :

$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 5}$

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$, **then find :**

1 $P(\grave{A})$ 2 $P(A \cup B)$

20 Qena Governorate

Answer the following questions : *(Calculators are permitted)*

1 **Choose the correct answer :**

1 If the curve of the quadratic function f does not intersect x-axis in any point , then the number of solutions of the equation $f(x) = 0$ is ....

(a) an infinite number of solutions. (b) two solutions.

(c) a unique solutions. (d) zero.

2 Half the number 2^4 is ....

(a) 1^4 (b) 2^2 (c) 2^3 (d) 4^2

3 The set of zeroes of the function $f : f(X) = X^2 + 9$ in $\mathbb{R}$ is ....

(a) $\varnothing$ (b) zero. (c) $\{3\}$ (d) $\{3 , -3\}$

4 If A , B are two mutually exclusive events from the sample space S of a random experiment , then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) zero. (c) 1 (d) 0.5

5 If the sum of ages of Ahmed and Mohamed now is 15 years , then the sum of their ages after 5 years is ....

(a) 20 years. (b) 25 years. (c) 30 years. (d) 35 years.

6 $\mathbb{R}_+ \cap \mathbb{R}_- =$ ....

(a) $\{0\}$ (b) $\varnothing$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{0\}$

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of two equations :** $X + 2y = 4$, $2X - y = 3$

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X^2 - 2X + 4}{X^3 + 8} + \frac{X^2 - 1}{X^2 + X - 2}$$

3 [a] **Find in $\mathbb{R}$ the solution set of the equation :**

$X^2 + 4 = 6X$ (approximating to the nearest one decimal)

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X - 1}{X^2 - 1} \div \frac{X^2 - 5X}{X^2 - 4X - 5}$$

4 [a] The sum of two real positive numbers is 7 , and the sum of their squares is 37 , find the two numbers.

[b] If $n_1(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$, $n_2(X) = \frac{2X}{2X + 4}$, **prove that :** $n_1 = n_2$

5 [a] If $n(X) = \frac{X^2 - 2X}{X^2 - X - 2}$, **find :** $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1} , then find $n^{-1}(3)$

[b] If A and B two events from the sample space S , $P(A) = 0.3$, $P(B) = 0.5$, $P(A \cap B) = 0.2$, **find :** $P(\grave{A})$, $P(A \cup B)$

21 Luxor Governorate

Answer the following questions :

1 Choose the correct answer :

1 The S.S. of the two equations : $x - 2 = 0$, $y + 3 = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 3)\}$ (b) $\{(-2 , -3)\}$ (c) $\{(2 , -3)\}$ (d) $\{(-2 , 3)\}$

2 The set of zeroes of the function $f : f(x) = 0$ is ....

(a) $\varnothing$ (b) $\mathbb{R}$ (c) $\{0\}$ (d) $\mathbb{R}_+$

3 If A and B are two mutually exclusive events , then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) zero (c) P (A) (d) P (B)

4 Half of 2^{10} is ....

(a) 2^9 (b) 2^5 (c) 2^{20} (d) 2^8

5 $3 \times 4 - 4 \div 2 =$ ....

(a) 6 (b) 8 (c) 10 (d) 12

6 $\sqrt{\sqrt{81}} =$ ....

(a) 9 (b) 3 (c) -9 (d) -3

2

[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the S.S. of pair of the equations :

$x - y = 4$, $3x + 2y = 7$

[b] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

3

[a] Find algebraically the S.S. of pair of the equations in $\mathbb{R} \times \mathbb{R}$: $x - y = 0$, $xy = 9$

[b] Find n (x) in the simplest form , showing the domain of n : $n(x) = \frac{x}{x - 4} - \frac{x + 4}{x^2 - 16}$

4

[a] Using the general rule , find in $\mathbb{R}$ the solution set of the equation : $x^2 + 3x - 3 = 0$

approximating the result to nearest two decimal digits.

[b] If A , B are two events of a random experiment and

$P(A) = \frac{1}{2}$, $P(B) = \frac{2}{3}$, $P(A \cap B) = \frac{1}{3}$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$

5

[a] Find n (x) in the simplest form , showing the domain of n :

$n(x) = \frac{3x - 15}{x + 3} \div \frac{5x - 25}{4x + 12}$

[b] A box contains 12 balls , 5 of them are blue , 4 are red , and the left are white.
A ball is randomly drawn from the box. **Find the probability that the drawn ball is :**

1 blue. 2 not red. 3 blue or red.

22 Aswan Governorate

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer :

1 If $3^{X} = 9$, then $X =$ ....

(a) 2 (b) 3 (c) 9 (d) 81

2 The set of solution of the two equations : $X - 3 = 0$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{3 , 4\}$ (b) $\{(4 , 3)\}$ (c) $\{(3 , 4)\}$ (d) $\varnothing$

3 If $5X = 6$, then $10X =$ ....

(a) 3 (b) 12 (c) 20 (d) 30

4 The domain of the function $f : f(X) = \frac{X + 2}{X - 3}$ is ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2 , 3\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R}$

5 If $\sqrt{64 + 36} = 8 + a$, then a = ...

(a) 6 (b) 4 (c) 3 (d) 2

6 If A and B are two mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) =$ ....

(a) 0.5 (b) 1 (c) zero. (d) $\varnothing$

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :** $X - y = 3$ and $2X + y = 9$

[b] **Find n (X) in its simplest form , showing the domain of n where :**

$$n(X) = \frac{X}{X - 2} - \frac{2X + 4}{X^2 - 4}$$

3 [a] **Use the general formula to find in $\mathbb{R}$ the S.S. of the equation :** $X^2 - 2X - 6 = 0$

[b] **Find n (X) in its simplest form , showing the domain of n where :**

$$n(X) = \frac{X^2 + 2X - 3}{X + 3} \times \frac{X + 1}{X^2 - 1}$$

4 [a] If $n(X) = \frac{X + 5}{X - 3}$, then find $n^{-1}(X)$ and show the domain of n^{-1}

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :**
$X - 3 = 0$ and $X^2 + y^2 = 25$

5 [a] If A and B are two events from a sample space of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$ and $P(A \cap B) = 0.2$

, find : 1 $P(A \cup B)$ 2 $P(\grave{A})$

[b] If $n_1(x) = \frac{x}{x+2}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$ **, prove that :** $n_1 = n_2$

23 New Valley Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 $\frac{1}{3} + \frac{1}{6} = \cdots\cdots$

(a) $\frac{1}{2}$ (b) $\frac{1}{9}$ (c) $\frac{2}{9}$ (d) $\frac{2}{3}$

2 If $bc^2 = 12$ and $bc = 6$, then $c = \cdots\cdots$

(a) 3 (b) 2 (c) 4 (d) 6

3 A rectangle of a perimeter 30 cm. and its width is 5 cm. , then its length is ………… cm.

(a) 5 (b) 10 (c) 15 (d) 20

4 If $A \subset B$, $P(A) = 0.2$, $P(B) = 0.6$, then $P(A \cup B) = \cdots\cdots$

(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

5 The set of zeroes of $f : f(x) = x + 1$ is ……………

(a) $\{-1\}$ (b) $\{1\}$ (c) $\varnothing$ (d) $\mathbb{R} - \{-1\}$

6 If the curve of the function f where $f(x) = x^2 - 4x + 3$ intersects the x-axis in the two points $(3 , 0)$ and $(1 , 0)$, then the solution set of equation $f(x) = 0$ in $\mathbb{R}$ is ……………

(a) $\{1\}$ (b) $\{3\}$ (c) $\{1 , 3\}$ (d) $\{0 , 1 , 3\}$

2 [a] **Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$:** $x + y = 10$, $x - y = 4$

[b] **Find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 5x + 6 = 0$ by using the general rule.

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$, $xy = 9$

[b] If the domain of the function $n : n(x) = \frac{x-1}{x^2 - ax + 9}$ is $\mathbb{R} - \{3\}$ **, then find :**

1 The value of a 2 The value of $n(1)$

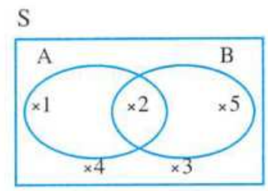
4 [a] **Simplify :** $n(x) = \frac{x^3-8}{x^2+x-6} \times \frac{x+3}{x^2+2x+4}$, showing the domain of n

[b] If $n(x) = \frac{x^2-2x}{x^2-3x+2}$, then find : $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

5 [a] **Find n (X) in the simplest form showing the domain where :** $n(X) = \frac{X}{X-4} - \frac{4X+16}{X^2-16}$

[b] **In the opposite figure :**

If A and B are two events in a sample space S of a random experiment then **, find :**



1 $P(A)$ 2 $P(\grave{B})$ 3 $P(A \cap B)$

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from the given answers :**

1 The point $(-2, -3)$ lies in the .... quadrant.

(a) first (b) second (c) third (d) fourth

2 The solution set of the equation : $X^2 - 4 = 0$ in $\mathbb{R}$ is ....

(a) $\{-2, 2\}$ (b) $\{-2\}$ (c) $\{2\}$ (d) $\varnothing$

3 If $\frac{4}{7} X = \frac{4}{7}$, then $X =$ ....

(a) zero. (b) 1 (c) 4 (d) 7

4 The two straight lines : $X + 2y = 1$, $2X + 4y = 6$ are ....

(a) congruent. (b) intersecting. (c) perpendicular. (d) parallel.

5 If $X \neq$ zero , then $\frac{5X}{X^2+1} \div \frac{X}{X^2+1} =$ ....

(a) -5 (b) -1 (c) 1 (d) 5

6 If A and B are two mutually exclusive events , then $P(A \cap B) =$ ....

(a) zero. (b) $\varnothing$ (c) $\frac{1}{2}$ (d) 1

2 [a] **Find in $\mathbb{R}$ the set of zeroes of the function f :** $f(X) = X^2 - 2X + 1$

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$ **, prove that :** $n_1 = n_2$

3 **Find n (X) in the simplest form , showing the domain :**

1 $n(X) = \frac{2X}{X+2} + \frac{4}{X+2}$

2 $n(X) = \frac{X^2 + X}{X^2 - 1} \times \frac{X^2 - 6X + 5}{X - 5}$

4 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$y - x = 3$ and $x^2 + y^2 - x y = 13$

[b] Using the general rule , find the solution set of the equation : $x^2 - 2x - 6 = 0$ in $\mathbb{R}$, rounding the results to two decimal places.

---

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :**

$y = x + 4$, $x + y = 4$

[b] If A and B are two mutually exclusive events from a sample space of a random experiment and $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$ **, find :** P (B)

25 North Sinai Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from those given :**

1. If $x - y = 0$ and $x y = 16$, then y = ...
   (a) 4 (b) – 4 (c) ± 4 (d) zero.

2. If x is the additive identity element and y is the multiplicative identity element , then $(5)^x + (9)^y =$ ....
   (a) 10 (b) 5 (c) 9 (d) 3

3. If $n(x) = \frac{x-1}{x+1}$, then the domain of n^{-1} is ....
   (a) $\{-1\}$ (b) $\mathbb{R} - \{1 , -1\}$ (c) $\mathbb{R} - \{-1\}$ (d) $\mathbb{R}$

4. The S.S. of the two equations : $x - y = 3$, $x + y = 5$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $\{(1 , 4)\}$ (b) $\{(4 , 1)\}$ (c) $\{(-4 , 1)\}$ (d) $\{(1 , -4)\}$

5. The common domain of the two functions : $\frac{7}{x-5}$, $\frac{8}{x-3}$ is ....
   (a) $\mathbb{R}$ (b) $\mathbb{R} - \{5 , 3\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{3\}$

6. The probability of the certain event is ....
   (a) 1 (b) $\frac{1}{2}$ (c) – 1 (d) zero.

---

2 **[a]** Find in $\mathbb{R}$ the solution set of the equation by using the general formula , rounding the results to two decimals : $3x^2 - 5x + 1 = 0$

[b] If n_1 and n_2 are two algebraic fractions where : $n_1(x) = \frac{1}{x-2}$, $n_2(x) = \frac{3}{x^2-4}$, find the common domain of n_1 and n_2

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations : $X - y = 1$, $X^2 - y^2 = 25$**

[b] **Find n (X) in the simplest form , showing the domain of n :**

$$n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$$

4 [a] If A , B are events from a sample space of a random experiment , P (A) = 0.3 , P (B) = 0.6 , P (A ∩ B) = 0.2 , **find :** P (A ∪ B) , P (A – B)

[b] If $n(X) = \frac{X^2}{X - 1} + \frac{X}{1 - X}$, find n (X) in the simplest form , showing the domain of n

5 [a] If $n_1(X) = \frac{1}{X}$, $n_2(X) = \frac{X^2 + 4}{X^3 + 4X}$, **prove that :** $n_1 = n_2$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations graphically :** $2X + y = 5$, $X + y = 4$

26 Red Sea Governorate

Answer the following questions :

1 Choose the correct answer from those given :

1 The number of common solutions for the two equations : $X + y = 2$ and $X + y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero. (b) 1 (c) 2 (d) 3

2 If A and B are two mutually exclusive events in the sample space of a random experiment , then P (A ∩ B) = ...

(a) zero. (b) 1 (c) 0.5 (d) ∅

3 The ordered pair which satisfies the equation : $X - y = 1$ is ....

(a) (1 , 1) (b) (2 , 1) (c) (1 , 2) (d) $\left(\frac{1}{2}, 1\right)$

4 The domain of the function n : $n(X) = \frac{2}{X - 5}$ is ....

(a) $\mathbb{R} - \{5\}$ (b) $\mathbb{R}$ (c) $\mathbb{R} - \{-5\}$ (d) $\mathbb{R} - \{2\}$

5 The point of intersection of the two straight lines : $X = -1$ and $y = 1$ lies in the .... quadrant.

(a) first (b) second (c) third (d) fourth

6 The set of zeroes of the function $f : f(X) = X^2 + 16$ in $\mathbb{R}$ is ....

(a) {4} (b) {– 4} (c) {4 , – 4} (d) ∅

2 [a] **Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x^2 - 3x - 3 = 0$

[b] **Put in the simplest form showing the domain :** $n(x) = \frac{x}{x-4} - \frac{x+4}{x^2-16}$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations algebraically :**

$2x - y = 5$, $x + y = 4$

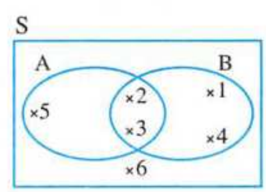
[b] **Put in the simplest form showing the domain :** $n(x) = \frac{x^3-8}{x^2+x-6} \times \frac{x+3}{x^2+2x+4}$

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 1$ and $x^2 + y^2 = 25$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$ **, prove that :** $n_1 = n_2$

5 [a] The opposite figure represents the two events A and B in a sample space of a random experiment **, find :**



1 $P(A \cap B)$ 2 $P(A - B)$

3 $P(A \cup B)$

[b] Graph the function $f : f(x) = x^2 - 1$ where $x \in [-2, 2]$,
then find the solution set of the equation : $x^2 - 1 = 0$

27 Matrouh Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 $\sqrt{25} =$ ....

(a) 5 (b) -5 (c) ± 5 (d) 25

2 The S.S. of the equation : $x^2 - 4 = 0$ in $\mathbb{R}$ is ....

(a) $\{2\}$ (b) $\{-2\}$ (c) $\{-2, 2\}$ (d) $\varnothing$

3 $\left(\frac{1}{2}\right)^{\text{zero}} =$ ....

(a) zero (b) $\frac{1}{2}$ (c) 1 (d) 2

4 The set of zeroes of f where $f(x) = x - 5$ is ....

(a) $\{\text{zero}\}$ (b) $\{5\}$ (c) $\{-5\}$ (d) $\{-5, 5\}$

5 If $3 \in \{1, x, 7\}$, then $x =$ ....

(a) 1 (b) 3 (c) 5 (d) 7

6 If a regular die is tossed once, the probability of appearance of a number less than 3 equals ....

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

2 [a] **Find the solution set of the two equations in $\mathbb{R} \times \mathbb{R}$: $x = 2$, $xy = 6$**

[b] **Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \frac{x}{x-3} \div \frac{3x}{x^2-9}$

3 [a] If A and B are two events in the sample space of a random experiment, and $P(A) = \frac{1}{2}$, $P(B) = \frac{2}{3}$ and $P(A \cap B) = \frac{1}{3}$, **then find :** $P(A \cup B)$

[b] **Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \frac{x-1}{x+1} + \frac{x+3}{x+1}$

4 [a] If n_1 , n_2 are two algebraic fractions where : $n_1(x) = \frac{1}{x-1}$, $n_2(x) = \frac{3}{x^2-4}$, then calculate the common domain of n_1 , n_2

[b] **By using the general formula, find in $\mathbb{R}$ the solution set of the equation :**

$x^2 - 2x - 4 = 0$ (approximating to the nearest one decimal)

5 [a] If $n_1(x) = \frac{x-1}{x}$, $n_2(x) = \frac{(x-1)(x^2+1)}{x(x^2+1)}$, **prove that :** $n_1 = n_2$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + y = 2$, $x = y + 6$

2022

Answers of governorates' examinations of algebra & probability

1 Cairo

1

1 b   2 c   3 a   4 d   5 c   6 b

2

[a] 1 $P(\grave{A}) = 1 - P(A) = 1 - 0.4 = 0.6$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.4 + 0.5 - 0.3 = 0.6$

[b] $\because X + y = 2$ (1)

$, y = X + 2$ (2)

Substituting from (2) in (1) :

$\therefore X + X + 2 = 2$ $\therefore 2X + 2 = 2$

$\therefore 2X = 0$ $\therefore X = 0$

Substituting in (2) : $\therefore y = 2$

$\therefore$ The S.S. $= \{(0, 2)\}$

3

[a] $\because X^2 - X - 1 = 0$ $\therefore a = 1, b = -1, c = -1$

$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -1}}{2 \times 1} = \frac{1 \pm \sqrt{5}}{2}$

$\therefore X \approx 1.6$ or $X = -0.6$

$\therefore$ The S.S. $= \{1.6, -0.6\}$

[b] $\because n(X) = \frac{X-4}{X+7} \div \frac{(X-4)(X+4)}{(X+7)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-7, -4, 4\}$

$, n(X) = \frac{X-4}{X+7} \times \frac{X+7}{X-4} = 1$

4

[a] $\because n_1(X) = \frac{1}{X-2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2\}$ (1)

$, \because n_2(X) = \frac{X^2 + 2X + 4}{(X-2)(X^2 + 2X + 4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{2\}$ (2)

$, \because n_2(X) = \frac{1}{X-2}$

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because X = y$ (1)

$, X^2 + y^2 = 18$ (2)

Substituting from (1) in (2) :

$\therefore X^2 + X^2 = 18$ $\therefore 2X^2 = 18$

$\therefore X^2 = 9$ $\therefore X = 3$ or $X = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

5

[a] $\because n(X) = \frac{X-5}{(X-5)(X+3)} + \frac{8}{2(X+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{5, -3\}$

$, n(X) = \frac{1}{X+3} + \frac{4}{X+3} = \frac{5}{X+3}$

[b] $\because n(X) = \frac{(X-5)(X+5)}{X(X-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 5\}$

$, n(X) = \frac{X+5}{X}$

2 Giza

1

1 a   2 c   3 d   4 d   5 b   6 b

2

[a] 1 $\because P(A \cap B) = \frac{1}{8}$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{1}{3} - \frac{1}{8} = \frac{17}{24}$

2 $\because$ A , B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

[b] $\because 2X + y = 1$ $\therefore y = 1 - 2X$ (1)

$, X + 2y = 5$ (2)

Substituting from (1) in (2) :

$\therefore X + 2(1 - 2X) = 5$ $\therefore X + 2 - 4X = 5$

$\therefore -3X + 2 = 5$ $\therefore -3X = 3$

$\therefore X = -1$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(-1, 3)\}$

3

[a] $\because 2X^2 - 5X + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore X = 2.3$ or $X = 0.2$

$\therefore$ The S.S. $= \{2.3 , 0.2\}$

[b] $\because n(X) = \frac{(X+1)(X+3)}{(X-3)(X^2+3X+9)} \div \frac{X+3}{X^2+3X+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , -3\}$

, $n(X) = \frac{(X+1)(X+3)}{(X-3)(X^2+3X+9)} \times \frac{X^2+3X+9}{X+3}$

$= \frac{X+1}{X-3}$

, $\because n(2) = \frac{2+1}{2-3} = -3$

, $n(-3)$ is undefined because $-3 \notin$ the domain of n

4

[a] $\because n(X) = \frac{X}{X-4} - \frac{X+4}{(X-4)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , -4\}$

, $n(X) = \frac{X}{X-4} - \frac{1}{X-4} = \frac{X-1}{X-4}$

[b] $\because X - y = 1$ $\therefore X = 1 + y$ (1)

, $X^2 + y^2 = 25$ (2)

Substituting from (1) in (2):

$\therefore (1+y)^2 + y^2 = 25$ $\therefore 1 + 2y + y^2 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$ $\therefore y^2 + y - 12 = 0$

$\therefore (y+4)(y-3) = 0$ $\therefore y = -4$ or $y = 3$

Substituting in (1): $\therefore X = -3$ or $X = 4$

$\therefore$ The S.S. $= \{(-3 , -4) , (4 , 3)\}$

5

[a] $\because n_1(X) = \frac{(X-2)(X+2)}{(X-2)(X+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2 , -3\}$ (1)

, $n_1(X) = \frac{X+2}{X+3}$

, $\because n_2(X) = \frac{(X+2)(X-3)}{(X+3)(X-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-3 , 3\}$ (2)

, $n_2(X) = \frac{X+2}{X+3}$

From (1) and (2): $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

[b] $\because \{-3 , 3\}$ is the set of zeroes of the function

$\therefore f(3) = 0$ $\therefore 3^2 + a = 0$

$\therefore 9 + a = 0$ $\therefore a = -9$

3 Alexandria

1

1 b	2 a	3 b	4 a	5 b	6 b

2

[a] $\because X - y = 0$ $\therefore X = y$ (1)

, $\because X^2 + Xy + y^2 = 27$ (2)

Substituting from (1) in (2):

$\therefore X^2 + X \times X + X^2 = 27$ $\therefore X^2 + X^2 + X^2 = 27$

$\therefore 3X^2 = 27$ $\therefore X^2 = 9$

$\therefore X = 3$ or $X = -3$

Substituting in (1): $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n_1(X) = \frac{X^2+4}{(X-2)(X+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2 , -2\}$

, $\because n_2(X) = \frac{7}{(X+2)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$\therefore$ The common domain $= \mathbb{R} - \{2 , -2\}$

3

[a] $\because X^2 - 4X + 1 = 0$

$\therefore a = 1 , b = -4 , c = 1$

$\therefore X = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{4 \pm \sqrt{12}}{2}$

$= \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3} = 2 \pm 1.7$

$\therefore X = 3.7$ or $X = 0.3$

$\therefore$ The S.S. $= \{3.7 , 0.3\}$

[b] $\because n(X) = \frac{X-3}{(X-3)(X-4)} - \frac{X-3}{X-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , 4\}$

, $n(X) = \frac{1}{X-4} - 1 = \frac{1}{X-4} - \frac{X-4}{X-4} = \frac{5-X}{X-4}$

4

[a] $\because 3X + 2y = 7$ (1)

, $X - y = 4$ $\therefore X = y + 4$ (2)

Substituting from (2) in (1):

$\therefore 3(y+4) + 2y = 7$ $\therefore 3y + 12 + 2y = 7$

$\therefore 5y = -5$ $\therefore y = -1$

Substituting in (2) : $\therefore X = 3$

$\therefore$ The S.S. $= \{(3 , -1)\}$

[b] $\because n(X) = \frac{X^2 - X + 1}{X} \times \frac{X(X+1)}{(X+1)(X^2 - X + 1)}$

$\therefore$ The domain of n $= \mathbb{R} - \{0 , -1\}$, $n(X) = 1$

5

[a] $\because n(X) = \frac{(X-2)(X+2)}{(X-2)(X^2+2X+4)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+2)}$

, the domain of $n^{-1} = \mathbb{R} - \{2 , -2\}$

, $n^{-1}(X) = \frac{X^2+2X+4}{X+2}$

[b] $\because P(A - B) = P(A) - P(A \cap B)$

$\therefore P(A \cap B) = P(A) - P(A - B)$

$= 0.7 - 0.5 = 0.2$

4 El-Kalyoubia

1

1 b 2 c 3 d 4 b 5 d 6 a

2

[a] $\because n(X) = \frac{(X+7)(X-7)}{(X-2)(X^2+2X+4)} \div \frac{X+7}{X-2}$

$\therefore$ The domain of n $= \mathbb{R} - \{2 , -7\}$

, $n(X) = \frac{(X+7)(X-7)}{(X-2)(X^2+2X+4)} \times \frac{X-2}{X+7}$

$= \frac{X-7}{X^2+2X+4}$

[b] $\because 3X^2 - 5X + 1 = 0 \quad \therefore a = 3 , b = -5 , c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore X \approx 1.43$ or $X \approx 0.23$

$\therefore$ The S.S. $= \{1.43 , 0.23\}$

3

[a] $\because X + 3y = 7 \qquad \therefore X = 7 - 3y \qquad (1)$

$, 5X - y = 3 \qquad (2)$

Substituting from (1) in (2) :

$\therefore 5(7 - 3y) - y = 3 \qquad \therefore 35 - 15y - y = 3$

$\therefore -16y = -32 \qquad \therefore y = 2$

Substituting in (1) : $\therefore X = 1$

[b] $\because f_1(X) = \frac{X}{X+2}$

$\therefore$ The domain of $f_1 = \mathbb{R} - \{-2\}$ } (1)

, $f_2(X) = \frac{2X}{2(X+2)}$

$\therefore$ The domain of $f_2 = \mathbb{R} - \{-2\}$

, $f_2(X) = \frac{X}{X+2}$ } (2)

From (1) and (2) : $\therefore f_1 = f_2$

4

[a] $\because f(X) = \frac{X(X+2)}{(X-2)(X+2)} + \frac{X-3}{(X-3)(X-2)}$

$\therefore$ The domain of $f = \mathbb{R} - \{2 , -2 , 3\}$

, $f(X) = \frac{X}{X-2} + \frac{1}{X-2} = \frac{X+1}{X-2}$

[b] $\because X - 3 = 0 \qquad \therefore X = 3 \qquad (1)$

$, X^2 + y^2 = 25 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (3)^2 + y^2 = 25 \qquad \therefore 9 + y^2 = 25$

$\therefore y^2 = 16 \qquad \therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(3 , 4) , (3 , -4)\}$

5

[a] 1 $\because$ A , B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B)$

$= 0.3 + 0.6 = 0.9$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\because$ The curve of the function passes through (1 , 0)

$\therefore f(1) = 0 \qquad \therefore (1)^2 - a = 0$

$\therefore 1 - a = 0 \qquad \therefore a = 1$

5 El-Sharkia

1

1 a 2 c 3 b 4 a 5 c 6 d

2

[a] $\because X - y = 4 \qquad (1)$

$, 3X + y = 8 \qquad (2)$

Adding (1) and (2) : $\therefore 4X = 12 \qquad \therefore X = 3$

Substituting in (1) : $\therefore y = -1$

$\therefore$ The S.S. $= \{(3 , -1)\}$

[b] $\because n(X) = \frac{X}{X+4} - \frac{X-4}{(X-4)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-4 , 4\}$

$, n(X) = \frac{X}{X+4} - \frac{1}{X+4} = \frac{X-1}{X+4}$

3

[a] $\because X^2 + 3X - 3 = 0 \qquad \therefore a = 1 , b = 3 , c = -3$

$\therefore X = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times -3}}{2 \times 1} = \frac{-3 \pm \sqrt{21}}{2}$

$\therefore X \approx 0.791$ or $X \approx -3.791$

$\therefore$ The S.S. $= \{0.791 , -3.791\}$

[b] $\because n(X) = \frac{1}{(X-1)(X+1)} \div \frac{1}{X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1\}$

$, n(X) = \frac{1}{(X-1)(X+1)} \times (X+1) = \frac{1}{X-1}$

4

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

[b] $\because X - y = 4 \qquad \therefore X = y + 4 \qquad (1)$

$, X^2 + y^2 = 10 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (y+4)^2 + y^2 = 10$

$\therefore y^2 + 8y + 16 + y^2 - 10 = 0$

$\therefore 2y^2 + 8y + 6 = 0 \qquad \therefore y^2 + 4y + 3 = 0$

$\therefore (y+1)(y+3) = 0 \qquad \therefore y = -1$ or $y = -3$

Substituting in (1) : $\therefore X = 3$ or $X = 1$

$\therefore$ The S.S. $= \{(3 , -1) , (1 , -3)\}$

5

[a] $\because n(X) = \frac{X^2 + X + 1}{(X-1)(X^2 + X + 1)} \times \frac{X(X+2)}{(X-2)(X+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , 2 , -2\}$

$, n(X) = \frac{1}{X-1} \times \frac{X}{X-2} = \frac{X}{(X-1)(X-2)}$

[b] $\because$ The domain of $n = \mathbb{R} - \{2\}$

$\therefore (2)^2 - 2a + 4 = 0 \qquad \therefore 4 - 2a + 4 = 0$

$\therefore 8 - 2a = 0 \qquad \therefore -2a = -8$

$\therefore a = 4$

6 El-Monofia

1

1 b 2 c 3 c 4 a 5 a 6 d

2

[a] $\because 2X + y = 1 \qquad \therefore y = 1 - 2X \qquad (1)$

$, X + 2y = 5 \qquad (2)$

Substituting from (1) in (2) :

$\therefore X + 2(1 - 2X) = 5 \qquad \therefore X + 2 - 4X = 5$

$\therefore -3X = 3 \qquad \therefore X = -1$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(-1 , 3)\}$

[b] $\because n(X) = \frac{5}{X-3} - \frac{4}{X-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3\}$

$, n(X) = \frac{5}{X-3} - \frac{4}{X-3} = \frac{1}{X-3}$

3

[a] $\because 2X^2 - 5X + 1 = 0 \qquad \therefore a = 2 , b = -5 , c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore X \approx 2.28$ or $X \approx 0.22$

$\therefore$ The S.S. $= \{2.28 , 0.22\}$

[b] 1 $\because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$

, the domain of $n^{-1} = \mathbb{R} - \{0 , 2 , 1\}$

$, n^{-1}(X) = \frac{X-1}{X}$

2 $n^{-1}(2)$ is undefined because $2 \notin$ the domain of n^{-1}

4

[a] $\because X - y = 0 \qquad \therefore X = y \qquad (1)$

$, Xy = 9 \qquad (2)$

Substituting from (1) in (2) :

$\therefore X \times X = 9 \qquad \therefore X^2 = 9$

$\therefore X = 3$ or $X = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n(X) = \frac{X^2}{X(X-3)} \div \frac{3X}{(X-3)(X+3)}$

$\therefore$ The domain of n = $\mathbb{R} - \{0, 3, -3\}$

, $n(X) = \frac{X}{X-3} \times \frac{(X-3)(X+3)}{3X} = \frac{X+3}{3}$

5

[a] $\because n_1(X) = \frac{X^2}{X^2(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$, $n_1(X) = \frac{1}{X-1}$ (1)

, $\because n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$, $n_2(X) = \frac{1}{X-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.3 + 0.6 - 0.2 = 0.7$

3 $P(A - B) = P(A) - P(A \cap B)$
$= 0.3 - 0.2 = 0.1$

7 El-Gharbia

1

1 d 2 a 3 c 4 a 5 a 6 d

2

[a] $\because X^2 - 4X + 2 = 0 \quad \therefore a = 1, b = -4, c = 2$

$\therefore X = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 2}}{2 \times 1} = \frac{4 \pm 2\sqrt{2}}{2}$
$= 2 \pm \sqrt{2}$

$\therefore X \approx 3.4$ or $X \approx 0.6$

$\therefore$ The S.S. = $\{3.4, 0.6\}$

[b] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X-1)} \times \frac{X+1}{X^2+2X+4}$

$\therefore$ The domain of n = $\mathbb{R} - \{2, 1\}$

, $n(X) = \frac{X^2+2X+4}{X-1} \times \frac{X+1}{X^2+2X+4} = \frac{X+1}{X-1}$

, n (2) is undefined because $2 \notin$ the domain of n

3

[a] $\because n(X) = \frac{X(X-2)}{(X-2)(X+2)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X+2)}{X(X-2)}$

, the domain of $n^{-1} = \mathbb{R} - \{0, 2, -2\}$

, $n^{-1}(X) = \frac{X+2}{X}$

, $\because n^{-1}(X) = 3 \quad \therefore \frac{X+2}{X} = 3$

$\therefore 3X = X + 2 \quad \therefore 2X = 2$

$\therefore X = 1$

[b] $\because X + y = 4$ (1)

, $2X - y = 2$ (2)

Adding (1) and (2) :

$\therefore 3X = 6 \quad \therefore X = 2$

Substituting in (1) : $\therefore y = 2$

$\therefore$ The S.S. = $\{(2, 2)\}$

4

[a] $\because X + y = 5 \quad \therefore X = 5 - y$ (1)

, $X^2 - y^2 = 55$ (2)

Substituting from (1) in (2) :

$\therefore (5-y)^2 - y^2 = 55$

$\therefore 25 - 10y + y^2 - y^2 = 55$

$\therefore -10y = 30 \quad \therefore y = -3$

Substituting in (1) : $\therefore X = 8$

$\therefore$ The S.S. = $\{(8, -3)\}$

[b] $\because n_1(X) = \frac{2X}{2(X+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(X) = \frac{X}{X+2}$ (1)

, $\because n_2(X) = \frac{X(X+2)}{(X+2)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$, $n_2(X) = \frac{X}{X+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(X) = \frac{X(X-1)}{(X-1)(X+1)} + \frac{X-3}{(X-3)(X+1)}$

$\therefore$ The domain of n = $\mathbb{R} - \{1, -1, 3\}$

, $n(X) = \frac{X}{X+1} + \frac{1}{X+1} = \frac{X+1}{X+1} = 1$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.6 - 0.4 = 0.9$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

8 El-Dakahlia

1

[a] 1 b   2 a   3 d

[b] $\because X(X-1) = 4$ $\therefore X^2 - X - 4 = 0$

$\therefore a = 1 , b = -1 , c = -4$

$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$\therefore X \approx 2.6$ or $X \approx -1.6$

$\therefore$ The S.S. $= \{2.6 , -1.6\}$

2

[a] 1 a   2 d   3 c

[b] $\because n_1(X) = \frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$
$, n_1(X) = \frac{X}{X+4}$ (1)

$, \because n_2(X) = \frac{X(X+4)}{(X+4)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$
$, n_2(X) = \frac{X}{X+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because$ The domain of $n = \mathbb{R} - \{0 , 4\}$

$\therefore 4 - a = 0$ $\therefore a = 4$

$, \because n(5) = 2$ $\therefore \frac{b}{5} + \frac{9}{5-4} = 2$

$\therefore \frac{b}{5} + 9 = 2$ $\therefore \frac{b}{5} = -7$

$\therefore b = -35$

[b] Let the measures of the two angles be : X , y

$\therefore X - y = 50°$ (1)

$, X + y = 90°$ (2)

Adding (1) and (2) : $\therefore 2X = 140°$

$\therefore X = 70°$

Substituting in (1) : $\therefore y = 20°$

$\therefore$ The measures of the two angles are : 70° and 20°

4

[a] $\because n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2} + \frac{X^2 - 4}{X^2 + X - 2}$

$= \frac{X(X-2)}{(X-2)(X-1)} + \frac{(X-2)(X+2)}{(X+2)(X-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , 1 , -2\}$

$, n(X) = \frac{X}{X-1} + \frac{X-2}{X-1} = \frac{2X-2}{X-1} = \frac{2(X-1)}{X-1} = 2$

[b] $\because y + 2X = 7$ $\therefore y = 7 - 2X$ (1)

$, (y + 2X - 8)^2 + X^2 = 5$ (2)

Substituting from (1) in (2) :

$\therefore (7 - 2X + 2X - 8)^2 + X^2 = 5$

$\therefore (-1)^2 + X^2 = 5$ $\therefore 1 + X^2 = 5$

$\therefore X^2 = 4$ $\therefore X = 2$ or $X = -2$

Substituting in (1) : $\therefore y = 3$ or $y = 11$

$\therefore$ The S.S. $= \{(2 , 3) , (-2 , 11)\}$

5

[a] $\because n(X) = \frac{(X-2)(X^2 + 2X + 4)}{(X-2)(X+3)} \times \frac{X+3}{X^2 + 2X + 4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

$, n(X) = \frac{X^2 + 2X + 4}{X+3} \times \frac{X+3}{X^2 + 2X + 4} = 1$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.5 + 0.4 - 0.1 = 0.8$

2 $P(A - B) = P(A) - P(A \cap B) = 0.5 - 0.1 = 0.4$

9 Ismailia

1

1 c   2 a   3 d   4 d   5 d   6 b

2

[a] $\because X - 3 = 0$ $\therefore X = 3$ (1)

$, X^2 + y^2 = 25$ (2)

Substituting from (1) in (2) :

$\therefore 3^2 + y^2 = 25$ $\therefore 9 + y^2 = 25$

$\therefore y^2 = 16$ $\therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(3 , 4) , (3 , -4)\}$

[b] $\because n(X) = \frac{X}{X-2} - \frac{2(X+2)}{(X-2)(X+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -2\}$

$, n(X) = \frac{X}{X-2} - \frac{2}{X-2} = \frac{X-2}{X-2} = 1$

3

[a] $\because n_1(X) = \frac{(X-2)(X+3)}{(X-2)(X+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2, 2\}$ (1)

$, n_1(X) = \frac{X+3}{X+2}$

$, \because n_2(X) = \frac{(X-3)(X+3)}{(X-3)(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3, -2\}$ (2)

$, n_2(X) = \frac{X+3}{X+2}$

From (1) and (2) : $\therefore n_1 \neq n_2$

Because the domain of $n_1 \neq$ the domain of n_2

[b] $\because 2X^2 - 5X + 1 = 0 \quad \therefore a = 2, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore X = 2.28$ or $X = 0.22$

$\therefore$ The S.S. $= \{2.28, 0.22\}$

4

[a] $\because n(X) = \frac{X+2}{(X+2)(X-2)} \times \frac{2(X-2)}{X-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 2, 3\}$

$, n(X) = \frac{1}{X-2} \times \frac{2(X-2)}{X-3} = \frac{2}{X-3}$

[b] $\because$ A and B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

1 $P(A \cup B) = P(A) + P(B) = 0.2 + 0.5 = 0.7$

2 $P(A - B) = P(A) = 0.2$

5

[a] Let the measures of the two angles be : X , y

$\therefore X - y = 50°$ (1)

$, X + y = 90°$ (2)

Adding (1) and (2) : $\therefore 2X = 140°$

$\therefore X = 70°$

Substituting in (1) : $\therefore y = 20°$

$\therefore$ The measures of the two angles are : 70° and 20°

[b] $\because n(X) = \frac{X(X+2)}{(X-3)(X+3)} \div \frac{2X}{X+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 0\}$

$, n(X) = \frac{X(X+2)}{(X-3)(X+3)} \times \frac{X+3}{2X} = \frac{X+2}{2(X-3)}$

10 Suez

1

1 a 2 c 3 a 4 b 5 b 6 c

2

[a] $\because X + y = 4$ (1)

$, X - y = 2$ (2)

Adding (1) and (2) : $\therefore 2X = 6$

$\therefore X = 3$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(3, 1)\}$

[b] $\because n(X) = \frac{X(X-1)}{(X-1)(X+1)} + \frac{X+5}{(X+5)(X+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, -1, -5\}$

$, n(X) = \frac{X}{X+1} + \frac{1}{X+1} = \frac{X+1}{X+1} = 1$

3

[a] $\because X^2 - 3X + 1 = 0 \quad \therefore a = 1, b = -3, c = 1$

$\therefore X = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{3 \pm \sqrt{5}}{2} = \frac{3 \pm 2.24}{2}$

$\therefore X = 2.62$ or $X = 0.38$

$\therefore$ The S.S. $= \{2.62, 0.38\}$

[b] $\because n(X) = \frac{X(X+2)}{(X-2)(X+2)} \times \frac{X-2}{X+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, -3\}$

$, n(X) = \frac{X}{X-2} \times \frac{X-2}{X+3} = \frac{X}{X+3}$

4

[a] $\because X - y = 0 \quad \therefore X = y$ (1)

$, \because X^2 + y^2 = 32$ (2)

Substituting from (1) in (2) :

$\therefore X^2 + X^2 = 32 \quad \therefore 2X^2 = 32$

$\therefore X^2 = 16 \quad \therefore X = 4$ or $X = -4$

Substituting in (1) : $\therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(4, 4), (-4, -4)\}$

[b] $n(X) = \frac{X+3}{(X+3)(X-3)}$

$\therefore n^{-1}(X) = \frac{(X+3)(X-3)}{X+3}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{-3, 3\}$

$, n^{-1}(X) = X - 3$

5

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.6 - 0.4 = 0.9$

[b] $\because n_1(X) = \frac{X}{X+2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$ (1)

$, \because n_2(X) = \frac{2X}{2(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$, n_2(X) = \frac{X}{X+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

11 Port Said

1

1 a　2 c　3 c　4 d　5 c　6 a

2

[a] $\because X + y = 4$ (1)

$, 2X - y = 2$ (2)

$\therefore$ adding (1) and (2) : $\therefore 3X = 6$　$\therefore X = 2$

Substituting in (1) : $\therefore y = 2$

$\therefore$ The S.S. $= \{(2, 2)\}$

[b] $\because n(X) = \frac{X(X-2)}{(X-2)(X-3)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-3)}{X(X-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2, 3\}$

$, n^{-1}(X) = \frac{X-3}{X}$

3

[a] $\because X - 1 = 0$　$\therefore X = 1$ (1)

$, X^2 + y^2 = 10$ (2)

Substituting from (1) in (2) :

$\therefore 1^2 + y^2 = 10$　$\therefore 1 + y^2 = 10$

$\therefore y^2 = 9$

$\therefore y = 3$ or $y = -3$

$\therefore$ The S.S $= \{(1, 3), (1, -3)\}$

[b] $\because n_1(X) = \frac{1}{X+1}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-1\}$ (1)

$, \because n_2(X) = \frac{X^2 - X + 1}{(X+1)(X^2 - X + 1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-1\}$

$, n_2(X) = \frac{1}{X+1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because X^2 - X - 4 = 0$

$\therefore a = 1$, $b = -1$, $c = -4$

$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$\therefore X = \frac{1 + \sqrt{17}}{2}$ or $X = \frac{1 - \sqrt{17}}{2}$

$\therefore$ The S.S $= \left\{\frac{1+\sqrt{17}}{2}, \frac{1-\sqrt{17}}{2}\right\}$

[b] $\because n(X) = \frac{X}{X(X+2)} + \frac{X-2}{(X-2)(X+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, -2, 2\}$

$, n(X) = \frac{1}{X+2} + \frac{1}{X+2} = \frac{2}{X+2}$

5

[a] $\because n(X) = \frac{(X+1)^2}{2(X-4)} \times \frac{X-4}{X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{4, -1\}$

$, n(X) = \frac{(X+1)^2}{2(X-4)} \times \frac{X-4}{X+1} = \frac{X+1}{2}$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

12 Damietta

1

1 d　2 a　3 c　4 c　5 b　6 a

2

[a] $\because 2X - y = 3$ (1)

$, X + 2y = 4$　$\therefore X = 4 - 2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4 - 2y) - y = 3$　$\therefore 8 - 4y - y = 3$

$\therefore -5y = -5$　$\therefore y = 1$

Substituting in (2) : $\therefore X = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(X) = \frac{X^2+2X+4}{(X-2)(X^2+2X+4)} + \frac{(X-3)(X+3)}{(X-2)(X+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

, $n(X) = \frac{1}{X-2} + \frac{X-3}{X-2} = \frac{1+X-3}{X-2} = \frac{X-2}{X-2} = 1$

3

[a] $\because y - X = 2$ $\therefore y = X + 2$ (1)

, $X y = 3$ (2)

Substituting from (1) in (2) :

$\therefore X(X+2) = 3$ $\therefore X^2 + 2X - 3 = 0$

$\therefore (X+3)(X-1) = 0$ $\therefore X = -3$ or $X = 1$

Substituting in (1) :

$\therefore y = -1$ or $y = 3$

$\therefore$ The S.S. $= \{(-3, -1), (1, 3)\}$

[b] $\because n(X) = \frac{(X+1)^2}{2(X-4)} \times \frac{X-4}{X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{4, -1\}$

, $n(X) = \frac{(X+1)^2}{2(X-4)} \times \frac{X-4}{X+1} = \frac{X+1}{2}$

4

[a] $\because X^2 - 5X + 3 = 0$

$\therefore a = 1$, $b = -5$, $c = 3$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 1 \times 3}}{2 \times 1} = \frac{5 \pm \sqrt{13}}{2}$

$\therefore X \approx 4.3$ or $X \approx 0.7$

$\therefore$ The S.S. $= \{4.3, 0.7\}$

[b] 1 $\because n(X) = \frac{X-2}{X+1}$

$\therefore n^{-1}(X) = \frac{X+1}{X-2}$

, the domain of $n^{-1} = \mathbb{R} - \{2, -1\}$

2 $n^{-1}(3) = \frac{3+1}{3-2} = 4$

5

[a] $\because n_1(X) = \frac{1}{X}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$ (1)

, $\because n_2(X) = \frac{X^2+4}{X(X^2+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

, $n_2(X) = \frac{1}{X}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

13 Kafr El-Sheikh

1

1 b 2 d 3 c 4 b 5 d 6 d

2

[a] $\because X - y = 1$ $\therefore X = y + 1$ (1)

, $X^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$

$\therefore y^2 + y - 12 = 0$ $\therefore (y+4)(y-3) = 0$

$\therefore y = -4$ or $y = 3$

Substituting in (1) :

$\therefore X = -3$ or $X = 4$

$\therefore$ The S.S. $= \{(-3, -4), (4, 3)\}$

[b] $\because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$

, The domain $n^{-1} = \mathbb{R} - \{0, 2, 1\}$

, $n^{-1}(X) = \frac{X-1}{X}$

3

[a] $\because 3X^2 - 5X + 1 = 0$

$\therefore a = 3$, $b = -5$, $c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore X \approx 1.43$ or $X \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+3)} \times \frac{X+3}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

, $n(X) = \frac{X^2+2X+4}{X+3} \times \frac{X+3}{X^2+2X+4} = 1$

4

[a] $\because n_1(X) = \frac{X^2}{X^2(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$, $n_1(X) = \frac{1}{X-1}$ (1)

, $\because n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$, $n_2(X) = \frac{1}{X-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

5

[a] $\because n(X) = \frac{X^2}{X-1} - \frac{X}{X-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

, $n(X) = \frac{X^2 - X}{X-1} = \frac{X(X-1)}{X-1} = X$

[b] $\because X + y = 5$ (1)

, $X - y = 1$ (2)

Adding (1) and (2) : $\therefore 2X = 6$ $\therefore X = 3$

Substituting in (1) : $\therefore y - 2$

$\therefore$ The S.S. $= \{(3, 2)\}$

14 El-Beheira

1

1 a 2 a 3 c 4 a 5 b 6 c

2

[a] $\because X + y = 5$ (1)

, $X - y = 7$ (2)

Adding (1) and (2) : $\therefore 2X = 12$ $\therefore X = 6$

Substituting in (1) : $\therefore y = -1$

$\therefore$ The S.S. $= \{(6, -1)\}$

[b] $\because n(X) = \frac{X-3}{(X-3)(X-4)} - \frac{4}{X-4}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4\}$

, $n(X) = \frac{1}{X-4} - \frac{4}{X-4} = \frac{1-4}{X-4} = \frac{-3}{X-4}$

3

[a] $\because X + y = 3$ $\therefore y = 3 - X$ (1)

, $X^2 + y^2 = 5$ (2)

Substituting from (1) in (2) :

$\therefore X^2 + (3 - X)^2 = 5$

$\therefore X^2 + 9 - 6X + X^2 - 5 = 0$

$\therefore 2X^2 - 6X + 4 = 0$ $\therefore X^2 - 3X + 2 = 0$

$\therefore (X-1)(X-2) = 0$ $\therefore X = 1$ or $X = 2$

Substituting in (1) : $\therefore y = 2$ or $y = 1$

$\therefore$ The S.S. $= \{(1, 2), (2, 1)\}$

[b] $\because n(X) = \frac{(X-2)(X-6)}{(X-2)^2} + \frac{(X+1)(X-5)}{(X-2)(X-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, 5\}$

, $n(X) = \frac{X-6}{X-2} + \frac{X+1}{X-2} = \frac{X-6+X+1}{X-2} = \frac{2X-5}{X-2}$

4

[a] $\because 3X^2 - 5X - 4 = 0$

$\therefore a = 3$, $b = -5$, $c = -4$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times -4}}{2 \times 3} = \frac{5 \pm \sqrt{73}}{6}$

$\therefore X \approx 2.26$ or $X \approx -0.59$

[b] $\because n_1(X) = \frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$, $n_1(X) = \frac{X}{X+4}$ (1)

, $\because n_2(X) = \frac{X(X+4)}{(X+4)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$, $n_2(X) = \frac{X}{X+4}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(X) = \frac{(X-1)(X^2+X+1)}{(X-1)^2} \times \frac{2(X-1)}{X^2+X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

, $n(X) = \frac{X^2+X+1}{X-1} \times \frac{2(X-1)}{X^2+X+1} = 2$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.6 = 0.4$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.7 - 0.4 = 0.9$

3 $P(A - B) = P(A) - P(A \cap B) = 0.6 - 0.4 = 0.2$

15 El-Fayoum

1

1 d 2 b 3 a 4 a 5 c 6 a

2

[a] $\because X(X-5)=7 \quad \therefore X^2-5X-7=0$

$\therefore a=1 \ , \ b=-5 \ , \ c=-7$

$\therefore X=\frac{5\pm\sqrt{(-5)^2-4\times1\times-7}}{2\times1}=\frac{5\pm\sqrt{53}}{2}$

$\therefore X\approx6.1$ or $X\approx-1.1$

$\therefore$ The S.S. $=\{6.1 , -1.1\}$

[b] Let the first number be X

, the second number be y

$\therefore X=2y$ (1)

$, Xy=72$ (2)

Substituting from (1) in (2) :

$\therefore 2y\times y=72 \quad \therefore 2y^2=72$

$\therefore y^2=36 \quad \therefore y=6$ or $y=-6$ (refused)

Substituting in (1) : $\therefore X=12$

$\therefore$ The two numbers are : 12 , 6

3

[a] $\because n(X)=\frac{X(X-3)}{(X-3)(X-2)}-\frac{2(X+2)}{(X-2)(X+2)}$

$\therefore$ The domain of $n=\mathbb{R}-\{3 , 2 , -2\}$

$, n(X)=\frac{X}{X-2}-\frac{2}{X-2}=\frac{X-2}{X-2}=1$

[b] $\because f(X)=\frac{X(X+2)}{(X+2)(X^2-2X+4)}$

$\therefore f^{-1}(X)=\frac{(X+2)(X^2-2X+4)}{X(X+2)}$

, the domain of $f^{-1}=\mathbb{R}-\{0 , -2\}$

$, f^{-1}(X)=\frac{X^2-2X+4}{X}$

$, \because f^{-1}(X)=2 \quad \therefore \frac{X^2-2X+4}{X}=2$

$\therefore X^2-2X+4=2X \quad \therefore X^2-2X+4-2X=0$

$\therefore X^2-4X+4=0 \quad \therefore (X-2)^2=0$

$\therefore X-2=0 \quad \therefore X=2$

4

[a] $\because 2X+y=5$ (1)

$, X-y=4$ (2)

Adding (1) and (2) : $\therefore 3X=9 \quad \therefore X=3$

Substituting in (1) : $\therefore y=-1$

$\therefore$ The S.S. $=\{(3 , -1)\}$

[b] $\because$ The domain of $n=\mathbb{R}-\{3\}$

$\therefore 2\times3-b=0 \quad \therefore 6-b=0 \quad \therefore b=6$

5

[a] $\because n(X)=\frac{X^2-3X+9}{(X-1)(X+1)}\div\frac{(X+3)(X^2-3X+9)}{(X+3)(X+1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{1 , -1 , -3\}$

$, n(X)=\frac{X^2-3X+9}{(X-1)(X+1)}\times\frac{(X+3)(X+1)}{(X+3)(X^2-3X+9)}$

$=\frac{1}{X-1}$

[b] $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=0.5+0.3-0.7=0.1$

$, P(A-B)=P(A)-P(A\cap B)=0.5-0.1=0.4$

16 Beni Suef

1

1 d 2 b 3 c 4 a 5 c 6 a

2

[a] $\because y-3X=0 \quad \therefore y=3X$ (1)

$, X^2+Xy=4$ (2)

Substituting from (1) in (2) :

$\therefore X^2+X(3X)=4 \quad \therefore X^2+3X^2=4$

$\therefore 4X^2=4 \quad \therefore X^2=1$

$\therefore X=1$ or $X=-1$

Substituting in (1) : $\therefore y=3$ or $y=-3$

$\therefore$ The S.S. $=\{(1 , 3) , (-1 , -3)\}$

[b] $\because n(X)=\frac{X(X-1)}{(X-1)(X+1)}+\frac{X+5}{(X+5)(X+1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{1 , -1 , -5\}$

$, n(X)=\frac{X}{X+1}+\frac{1}{X+1}=\frac{X+1}{X+1}=1$

3

[a] $\because X^2-4X=1 \quad \therefore X^2-4X-1=0$

$\therefore a=1 \ , \ b=-4 \ , \ c=-1$

$\therefore X=\frac{4\pm\sqrt{(-4)^2-4\times1\times-1}}{2\times1}=\frac{4\pm2\sqrt{5}}{2}=2\pm\sqrt{5}$

$\therefore X\approx4.2$ or $X\approx-0.2$

$\therefore$ The S.S. $=\{4.2 , -0.2\}$

[b] $\because n_1(X)=\frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-4\}$, $n_1(X)=\frac{X}{X+4}$ (1)

, $\because n_2(X)=\frac{X(X+4)}{(X+4)^2}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-4\}$, $n_2(X)=\frac{X}{X+4}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

4

[a] $\because f(X)=X(X^2+X-20)=X(X+5)(X-4)$

$\therefore z(f)=\{0,-5,4\}$

[b] $\because 2X-y=3$ (1)

, $X+2y=4$ $\therefore X=4-2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4-2y)-y=3$ $\therefore 8-4y-y=3$

$\therefore -5y=-5$ $\therefore y=1$

Substituting in (2) : $\therefore X=2$

$\therefore$ The S.S. $=\{(2,1)\}$

5

[a] $\because n(X)=\frac{(X+2)(X^2-2X+4)}{(X-2)(X+2)}\times\frac{X-2}{(X^2-2X+4)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2,-2\}$

, $n(X)=\frac{X^2-2X+4}{X-2}\times\frac{X-2}{X^2-2X+4}=1$

, $n(3)=1$

, $n(2)$ is undefined because $2\notin$ the domain of n

[b] $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(B)=P(A\cup B)+P(A\cap B)-P(A)$
$=0.9+0.2-0.5=0.6$

, $P(A-B)=P(A)-P(A\cap B)=0.5-0.2=0.3$

17 El-Menia

1

1 a 2 c 3 b 4 c 5 d 6 b

2

[a] $\because X-3=0$ $\therefore X=3$ (1)

, $X^2+y^2=25$ (2)

Substituting from (1) in (2) :

$\therefore 3^2+y^2=25$ $\therefore 9+y^2=25$

$\therefore y^2=16$ $\therefore y=4$ or $y=-4$

$\therefore$ The S.S. $=\{(3,4),(3,-4)\}$

[b] $\because n(X)=\frac{X}{X+2}+\frac{2(X-2)}{(X-2)(X+2)}$

$\therefore$ The domain of $n=\mathbb{R}-\{-2,2\}$

, $n(X)=\frac{X}{X+2}+\frac{2}{X+2}=\frac{X+2}{X+2}=1$

3

[a] $\because n(X)=\frac{(X-1)(X^2+X+1)}{X(X-1)}\times\frac{X}{X^2+X+1}$

$\therefore$ The domain of $n=\mathbb{R}-\{0,1\}$

, $n(X)=\frac{X^2+X+1}{X}\times\frac{X}{X^2+X+1}=1$

[b] $\because 2X-y=3$ (1)

, $X+2y=4$ $\therefore X=4-2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4-2y)-y=3$

$\therefore 8-4y-y=3$

$\therefore -5y=-5$ $\therefore y=1$

Substituting in (2) : $\therefore X=2$

$\therefore$ The S.S. $=\{(2,1)\}$

4

[a] $\because n_1(X)=\frac{2X}{2(X+2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-2\}$, $n_1(X)=\frac{X}{X+2}$ (1)

, $\because n_2(X)=\frac{X(X+2)}{(X+2)^2}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-2\}$, $n_2(X)=\frac{X}{X+2}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

[b] $\because X^2+2X+1=0$ $\therefore a=1, b=2, c=1$

$\therefore X=\frac{-2\pm\sqrt{(2)^2-4\times1\times1}}{2\times1}=\frac{-2}{2}=-1$

$\therefore$ The S.S. $=\{-1\}$

5

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

$, P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$

[b] $\because n(X) = \frac{X}{X+3}$ $\therefore n^{-1}(X) = \frac{X+3}{X}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, -3\}$

18 Assiut

1

1 c 2 d 3 c 4 d 5 d 6 b

2

[a] $\because X - y = 0$ $\therefore X = y$ (1)

$, X y = 9$ (2)

Substituting from (1) in (2) : $\therefore X^2 = 9$

$\therefore X = 3$ or $X = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n(X) = \frac{X(X-3)}{(X-3)(X+3)} + \frac{X-1}{(X-1)(X+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 1\}$

$, n(X) = \frac{X}{X+3} + \frac{1}{X+3} = \frac{X+1}{X+3}$

3

[a] $\because 3X^2 - 5X + 1 = 0$ $\therefore a = 3, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore X \approx 1.43$ or $X \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] $\because n_1(X) = \frac{X^2}{X^2(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$, n_1(X) = \frac{1}{X-1}$

$, \because n_2(X) = \frac{X^2 + X + 1}{(X-1)(X^2 + X + 1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{1\}$

$, n_2(X) = \frac{1}{X-1}$

$\therefore n_1(X) = n_2(X)$ for all the values of

$\therefore X \in \mathbb{R} - \{0, 1\}$

4

[a] $\because X - y = 3$ (1)

$, 2X + y = 9$ (2)

Adding (1) and (2) :

$\therefore 3X = 12$ $\therefore X = 4$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(4, 1)\}$

[b] 1 $\because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$, n^{-1}(X) = \frac{X-1}{X}$

2 $\because n^{-1}(X) = 3$ $\therefore \frac{X-1}{X} = 3$

$\therefore 3X = X - 1$ $\therefore 2X = -1$

$\therefore X = -\frac{1}{2}$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

3 $P(\grave{B}) = 1 - P(B) = 1 - 0.6 = 0.4$

[b] 1 $\because n(X) = \frac{(X-2)(X^2 + 2X + 4)}{(X-2)^2} \times \frac{2(X-2)}{X^2 + 2X + 4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2\}$

$, n(X) = \frac{X^2 + 2X + 4}{X - 2} \times \frac{2(X-2)}{X^2 + 2X + 4} = 2$

2 n (2) is undefined because $2 \notin$ the domain of n

19 Souhag

1

1 c 2 b 3 b 4 d 5 a 6 c

2

[a] $\because X^2 - 2X - 4 = 0$ $\therefore a = 1, b = -2, c = -4$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$

$\therefore X \approx 3.24$ or $X \approx -1.24$

$\therefore$ The S.S. $= \{3.24, -1.24\}$

[b] $\because n_1(X) = \frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$, $n_1(X) = \frac{X}{X+4}$ (1)

, $\because n_2(X) = \frac{X(X+4)}{(X+4)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$, $n_2(X) = \frac{X}{X+4}$ (2)

From (1) , (2) : $\therefore n_1 = n_2$

3

[a] $\because y = 3 - X$ (1)

, $Xy = 2$ (2)

Substituting from (1) in (2) : $\therefore X(3 - X) = 2$

$\therefore 3X - X^2 - 2 = 0$ $\therefore X^2 - 3X + 2 = 0$

$\therefore (X - 1)(X - 2) = 0$ $\therefore X = 1$ or $X = 2$

Substituting in (1) : $\therefore y = 2$ or $y = 1$

$\therefore$ The S.S. = $\{(1 , 2) , (2 , 1)\}$

[b] 1 $\because n(X) = \frac{X-2}{X+1}$ $\therefore n^{-1}(X) = \frac{X+1}{X-2}$

, the domain of $n^{-1} = \mathbb{R} - \{2 , -1\}$

2 $n^{-1}(3) = \frac{3+1}{3-2} = 4$

4

[a] $\because 2X - y = 7$ (1)

, $X + y = 5$ (2)

Adding (1) , (2) : $\therefore 3X = 12$ $\therefore X = 4$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. = $\{(4 , 1)\}$

[b] $\because n(X) \frac{X(X+1)}{(X-1)(X+1)} + \frac{X-5}{(X-5)(X-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1 , 5\}$

, $n(X) = \frac{X}{X-1} + \frac{1}{X-1} = \frac{X+1}{X-1}$

5

[a] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+3)} \times \frac{X+3}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

, $n(X) = \frac{X^2+2X+4}{X+3} \times \frac{X+3}{X^2+2X+4} = 1$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.8 + 0.7 - 0.6 = 0.9$

20 Qena

1

1 d 2 c 3 a 4 b 5 b 6 b

2

[a] $\because X + 2y = 4$ $\therefore X = 4 - 2y$ (1)

, $2X - y = 3$ (2)

Substituting from (1) in (2) : $\therefore 2(4 - 2y) - y = 3$

$\therefore 8 - 4y - y = 3$ $\therefore -5y = -5$ $\therefore y = 1$

Substituting in (1) : $\therefore X = 2$

$\therefore$ The S.S. = $\{(2 , 1)\}$

[b] $\because n(X) = \frac{X^2-2X+4}{(X+2)(X^2-2X+4)} + \frac{(X+1)(X-1)}{(X+2)(X-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 1\}$

, $n(X) = \frac{1}{X+2} + \frac{X+1}{X+2} = \frac{1+X+1}{X+2} = \frac{X+2}{X+2} = 1$

3

[a] $\because X^2 + 4 = 6X$ $\therefore X^2 - 6X + 4 = 0$

$\therefore a = 1$, $b = -6$, $c = 4$

$\therefore X = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$

$\therefore X \approx 5.2$ or $X \approx 0.8$

$\therefore$ The S.S. = $\{5.2 , 0.8\}$

[b] $\because n(X) = \frac{X-1}{(X-1)(X+1)} \div \frac{X(X-5)}{(X+1)(X-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1 , 5 , 0\}$

, $n(X) = \frac{1}{X+1} \times \frac{X+1}{X} = \frac{1}{X}$

4

[a] Let the two numbers be : X , y

$\therefore X + y = 7$ $\therefore X = 7 - y$ (1)

, $X^2 + y^2 = 37$ (2)

Substituting from (1) in (2) : $\therefore (7 - y)^2 + y^2 = 37$

$\therefore 49 - 14y + y^2 + y^2 - 37 = 0$

$\therefore 2y^2 - 14y + 12 = 0$ $\therefore y^2 - 7y + 6 = 0$

$\therefore (y - 6)(y - 1) = 0$ $\therefore y = 6$ or $y = 1$

Substituting in (1) : $\therefore X = 1$ or $X = 6$

$\therefore$ The two numbers are : 6 and 1

[b] $\because n_1(X) = \frac{X(X+2)}{(X+2)^2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(X) = \frac{X}{X+2}$ (1)

$, \because n_2(X) = \frac{2X}{2(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$ $\Big\}$ (2)

$, n_2(X) = \frac{X}{X+2}$

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(X) = \frac{X(X-2)}{(X-2)(X+1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X+1)}{X(X-2)}$

, The domain of $n^{-1} = \mathbb{R} - \{0 , 2 , -1\}$

$, n^{-1}(X) = \frac{X+1}{X} , n^{-1}(3) = \frac{3+1}{3} = \frac{4}{3}$

[b] $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

$, P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.3 + 0.5 - 0.2 = 0.6$

21 Luxor

1

1 c 2 b 3 b 4 a 5 c 6 b

2

[a] $\because X - y = 4$ $\therefore X = y + 4$ (1)

$, 3X + 2y = 7$ (2)

Substituting from (1) in (2) :

$\therefore 3(y+4) + 2y = 7$ $\therefore 3y + 12 + 2y = 7$

$\therefore 5y = -5$ $\therefore y = -1$

Substituting in (1) : $\therefore X = 3$

$\therefore$ The S.S. $= \{(3 , -1)\}$

[b] $\because n_1(X) = \frac{2X}{2(X+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$ $\Big\}$ (1)

$, n_1(X) = \frac{X}{X+4}$

$, \because n_2(X) = \frac{X(X+4)}{(X+4)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$ $\Big\}$ (2)

$, n_2(X) = \frac{X}{X+4}$

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because X - y = 0$ $\therefore X = y$ (1)

$, Xy = 9$ (2)

Substituting from (1) in (2) : $\therefore X^2 = 9$

$\therefore X = 3$ or $X = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n(X) = \frac{X}{X-4} - \frac{X+4}{(X+4)(X-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , -4\}$

$, n(X) = \frac{X}{X-4} - \frac{1}{X-4} = \frac{X-1}{X-4}$

4

[a] $\because X^2 + 3X - 3 = 0$ $\therefore a = 1 , b = 3 , c = -3$

$\therefore X = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times -3}}{2 \times 1} = \frac{-3 \pm \sqrt{21}}{2}$

$\therefore X = 0.79$ or $X = -3.79$

$\therefore$ The S.S. $= \{0.79 , -3.79\}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= \frac{1}{2} + \frac{2}{3} - \frac{1}{3} = \frac{5}{6}$

2 $P(A - B) = P(A) - P(A \cap B) = \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$

5

[a] $\because n(X) = \frac{3(X-5)}{X+3} \div \frac{5(X-5)}{4(X+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3 , 5\}$

$, n(X) = \frac{3(X-5)}{X+3} \times \frac{4(X+3)}{5(X-5)} = \frac{12}{5}$

[b] The number of white balls $= 12 - (5 + 4) = 3$ balls

1 The probability that the drawn ball is blue $= \frac{5}{12}$

2 The probability that the drawn ball is not red
$= \frac{5+3}{12} = \frac{8}{12} = \frac{2}{3}$

3 The probability that the drawn ball is blue or red
$= \frac{5+4}{12} = \frac{9}{12} = \frac{3}{4}$

22 Aswan

1

1 a 2 c 3 b 4 a 5 d 6 c

2

[a] $\because X - y = 3$ (1)

$, 2X + y = 9$ (2)

Adding (1) and (2) : $\therefore 3X = 12$ $\therefore X = 4$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(4 , 1)\}$

[b] $\because n(X) = \frac{X}{X-2} - \frac{2(X+2)}{(X-2)(X+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$

$, n(X) = \frac{X}{X-2} - \frac{2}{X-2} = \frac{X-2}{X-2} = 1$

3

[a] $\because X^2 - 2X - 6 = 0 \quad \therefore a = 1, b = -2, c = -6$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times -6}}{2 \times 1} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore X = 1 + \sqrt{7}$ or $X = 1 - \sqrt{7}$

$\therefore$ The S.S. $= \{1 + \sqrt{7}, 1 - \sqrt{7}\}$

[b] $\because n(X) = \frac{(X+3)(X-1)}{X+3} \times \frac{X+1}{(X-1)(X+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3, 1, -1\}$

$, n(X) = (X-1) \times \frac{1}{X-1} = 1$

4

[a] $\because n(X) = \frac{X+5}{X-3} \qquad \therefore n^{-1}(X) = \frac{X-3}{X+5}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{-5, 3\}$

[b] $\because X - 3 = 0 \qquad \therefore X = 3 \qquad (1)$

$, X^2 + y^2 = 25 \qquad (2)$

Substituting from (1) in (2) :

$\therefore 3^2 + y^2 = 25 \qquad \therefore 9 + y^2 = 25$

$\therefore y^2 = 16 \qquad \therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(3, 4), (3, -4)\}$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\because n_1(X) = \frac{X}{X+2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$ } (1)

$, \because n_2(X) = \frac{X(X+2)}{(X+2)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$

$, n_2(X) = \frac{X}{X+2}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

23 New Valley

1

1 a 2 b 3 b 4 c 5 a 6 c

2

[a] $\because X + y = 10 \qquad (1)$

$, X - y = 4 \qquad (2)$

Adding (1) , (2) : $\therefore 2X = 14 \qquad \therefore X = 7$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(7, 3)\}$

[b] $\because X^2 - 5X + 6 = 0 \quad \therefore a = 1, b = -5, c = 6$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 1 \times 6}}{2 \times 1} = \frac{5 \pm 1}{2}$

$\therefore X = 3$ or $X = 2$

$\therefore$ The S.S. $= \{3, 2\}$

3

[a] $\because X - y = 0 \qquad \therefore X = y \qquad (1)$

$, X y = 9 \qquad (2)$

Substituting from (1) in (2) : $\therefore X^2 = 9$

$\therefore X = 3$ or $X = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] 1 $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore 3^2 - 3a + 9 = 0 \qquad \therefore 9 - 3a + 9 = 0$

$\therefore 18 - 3a = 0 \qquad \therefore -3a = -18$

$\therefore a = 6$

2 $n(1) = \frac{1-1}{(1)^2 - 6 \times 1 + 9} = 0$

4

[a] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+3)} \times \frac{X+3}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

$, n(X) = \frac{X^2+2X+4}{X+3} \times \frac{X+3}{X^2+2X+4} = 1$

[b] $\because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$

$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2, 1\}$

$, n^{-1}(X) = \frac{X-1}{X}$

5

[a] $\because n(X) = \frac{X}{X-4} - \frac{4(X+4)}{(X-4)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{4, -4\}$

$\therefore n(X) = \frac{X}{X-4} - \frac{4}{X-4} = \frac{X-4}{X-4} = 1$

[b] 1 $P(A) = \frac{2}{5}$ 2 $P(\grave{B}) = \frac{3}{5}$

3 $P(A \cap B) = \frac{1}{5}$

24 South Sinai

1

1 c	2 a	3 b	4 d	5 d	6 a

2

[a] $\because f(X) = X^2 - 2X + 1 = (X-1)^2$

$\therefore z(f) = \{1\}$

[b] $\because n_1(X) = \frac{X^2}{X^2(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$, n_1(X) = \frac{1}{X-1}$ } (1)

$, \because n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$

$, n_2(X) = \frac{1}{X-1}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

1 $\because n(X) = \frac{2X}{X+2} + \frac{4}{X+2}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2\}$

$, n(X) = \frac{2X}{X+2} + \frac{4}{X+2} = \frac{2X+4}{X+2} = \frac{2(X+2)}{X+2} = 2$

2 $\because n(X) = \frac{X(X+1)}{(X+1)(X-1)} \times \frac{(X-5)(X-1)}{X-5}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1, 1, 5\}$

$, n(X) = \frac{X}{X-1} \times (X-1) = X$

4

[a] $\because y - X = 3$ $\therefore y = X + 3$ (1)

$, X^2 + y^2 - Xy = 13$ (2)

Substituting from (1) in (2) :

$\therefore X^2 + (X+3)^2 - X(X+3) = 13$

$\therefore X^2 + X^2 + 6X + 9 - X^2 - 3X - 13 = 0$

$\therefore X^2 + 3X - 4 = 0$ $\therefore (X+4)(X-1) = 0$

$\therefore X = -4$ or $X = 1$

Substituting in (1) : $\therefore y = -1$ or $y = 4$

$\therefore$ The S.S. $= \{(-4, -1), (1, 4)\}$

[b] $\because X^2 - 2X - 6 = 0$

$\therefore a = 1$, $b = -2$, $c = -6$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times -6}}{2 \times 1} = \frac{2 \pm 2\sqrt{7}}{2}$

$= 1 \pm \sqrt{7}$

$\therefore X \approx 3.65$ or $X \approx -1.65$

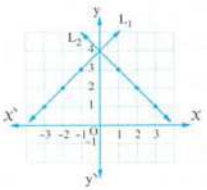
$\therefore$ The S.S. $= \{3.65, -1.65\}$

5

[a] $y = X + 4$, $y = 4 - X$

X	−1	−2	−3
y	3	2	1

X	1	2	3
y	3	2	1



From the graph : $\therefore$ The S.S. $= \{(0, 4)\}$

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B)$

$\therefore P(B) = P(A \cup B) - P(A) = \frac{7}{12} - \frac{1}{3} = \frac{1}{4}$

25 North Sinai

1

1 c	2 a	3 b	4 b	5 b	6 a

2

[a] $\because 3X^2 - 5X + 1 = 0$ $\therefore a = 3$, $b = -5$, $c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore X \approx 1.43$ or $X \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] $\because n_1(X) = \frac{1}{X-2}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2\}$

, $\because n_2(X) = \frac{3}{(X-2)(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{2 , -2\}$

$\therefore$ The common domain $= \mathbb{R} - \{2 , -2\}$

3

[a] $\because X - y = 1 \qquad \therefore X = y + 1 \qquad (1)$

, $X^2 - y^2 = 25 \qquad (2)$

Substituting from (1) in (2) : $\therefore (y+1)^2 - y^2 = 25$

$\therefore y^2 + 2y + 1 - y^2 = 25$

$\therefore 2y = 24 \qquad \therefore y = 12$

Substituting in (1) : $\therefore X = 13$

$\therefore$ The S.S. $= \{(13 , 12)\}$

[b] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+3)} \times \frac{X+3}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

, $n(X) = \frac{X^2+2X+4}{X+3} \times \frac{X+3}{X^2+2X+4} = 1$

4

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

, $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

[b] $\because n(X) = \frac{X^2}{X-1} - \frac{X}{X-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

, $n(X) = \frac{X^2}{X-1} - \frac{X}{X-1} = \frac{X^2 - X}{X-1} = \frac{X(X-1)}{X-1} = X$

5

[a] $\because n_1(X) = \frac{1}{X}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$ } (1)

, $\because n_2(X) = \frac{X^2+4}{X(X^2+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

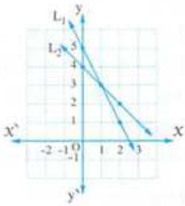
, $n_2(X) = \frac{1}{X}$ } (2)

From (1) , (2) : $\therefore n_1 = n_2$

[b] $y = 5 - 2X \qquad , \qquad y = 4 - X$

X	0	1	2
y	5	3	1

X	0	1	2
y	4	3	2



From the graph : $\therefore$ The S.S. $= \{(1 , 3)\}$

26 Red Sea

1

1 a	2 a	3 b	4 a	5 b	6 d

2

[a] $\because X^2 - 3X - 3 = 0$

$\therefore a = 1 , b = -3 , c = -3$

$\therefore X = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times -3}}{2 \times 1} = \frac{3 \pm \sqrt{21}}{2}$

$\therefore X = \frac{3 + \sqrt{21}}{2}$ or $X = \frac{3 - \sqrt{21}}{2}$

$\therefore$ The S.S. $= \left\{\frac{3+\sqrt{21}}{2} , \frac{3-\sqrt{21}}{2}\right\}$

[b] $\because n(X) = \frac{X}{X-4} - \frac{X+4}{(X-4)(X+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , -4\}$

, $n(X) = \frac{X}{X-4} - \frac{1}{X-4} = \frac{X-1}{X-4}$

3

[a] $\because 2X - y = 5 \qquad (1)$

, $X + y = 4 \qquad (2)$

Adding (1) and (2) : $\therefore 3X = 9 \qquad \therefore X = 3$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(3 , 1)\}$

[b] $\because n(X) = \frac{(X-2)(X^2+2X+4)}{(X-2)(X+3)} \times \frac{X+3}{X^2+2X+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

, $n(X) = \frac{X^2+2X+4}{X+3} \times \frac{X+3}{X^2+2X+4} = 1$

4

[a] $\because X - y = 1 \qquad \therefore X = y + 1 \qquad (1)$

, $X^2 + y^2 = 25 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0 \quad \therefore y^2 + y - 12 = 0$

$\therefore (y+4)(y-3) = 0 \quad \therefore y = -4$ or $y = 3$

Substituting in (1) : $\therefore X = -3$ or $X = 4$

$\therefore$ The S.S. $= \{(-3 , -4) , (4 , 3)\}$

[b] $\because n_1(X) = \frac{2X}{2(X+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(X) = \frac{X}{X+2}$ } (1)

, $\because n_2(X) = \frac{X(X+2)}{(X+2)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$, $n_2(X) = \frac{X}{X+2}$ } (2)

From (1) , (2) : $\therefore n_1 = n_2$

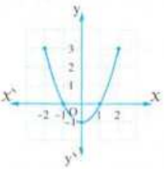
5

[a] 1 $P(A \cap B) = \frac{2}{6} = \frac{1}{3}$ 2 $P(A - B) = \frac{1}{6}$

3 $P(A \cup B) = \frac{5}{6}$

[b] $f(X) = X^2 - 1$

X	-2	-1	0	1	2
y	3	0	-1	0	3



From the graph : $\therefore$ The S.S. $= \{-1 , 1\}$

27 Matrouh

1

1 a 2 c 3 c 4 b 5 b 6 b

2

[a] $\because X = 2$ (1)

, $X y = 6$ (2)

Substituting from (1) in (2) : $\therefore 2y = 6 \quad \therefore y = 3$

$\therefore$ The S.S. $= \{(2 , 3)\}$

[b] $\because n(X) = \frac{X}{X-3} \div \frac{3X}{(X-3)(X+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 3 , -3\}$

, $n(X) = \frac{X}{X-3} \times \frac{(X-3)(X+3)}{3X} = \frac{X+3}{3}$

3

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{2}{3} - \frac{1}{3} = \frac{5}{6}$

[b] $\because n(X) = \frac{X-1}{X+1} + \frac{X+3}{X+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1\}$

, $n(X) = \frac{X-1}{X+1} + \frac{X+3}{X+1} = \frac{X-1+X+3}{X+1}$

$= \frac{2X+2}{X+1} = \frac{2(X+1)}{X+1} = 2$

4

[a] $\because n_1(X) = \frac{1}{X-1}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{1\}$

, $\because n_2(X) = \frac{3}{(X-2)(X+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{2 , -2\}$

$\therefore$ The common domain $= \mathbb{R} - \{1 , 2 , -2\}$

[b] $\because X^2 - 2X - 4 = 0$

$\therefore a = 1 \quad , \quad b = -2 \quad , \quad c = -4$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times -4}}{2 \times 1} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$

$\therefore X = 3.2$ or $X = -1.2$

$\therefore$ The S.S. $= \{3.2 , -1.2\}$

5

[a] $\because n_1(X) = \frac{X-1}{X}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$ } (1)

, $\because n_2(X) = \frac{(X-1)(X^2+1)}{X(X^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$, $n_2(X) = \frac{X-1}{X}$ } (2)

From (1) , (2) : $\therefore n_1 = n_2$

[b] $\because X + y = 2$ (1)

, $X = y + 6$ (2)

Substituting from (2) in (1) :

$\therefore y + 6 + y = 2 \quad \therefore 2y = -4 \quad \therefore y = -2$

Substituting in (2) : $\therefore X = 4$

$\therefore$ The S.S. $= \{(4 , -2)\}$

Answer the following questions :

1 Choose the correct answer from those given :

1. One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $(-4, 2)$ (b) $(2, -4)$ (c) $(3, 1)$ (d) $(4, 2)$
2. If $A \cap B = \varnothing$, then $P(A - B) =$ ....
   (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1
3. If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k =$ ....
   (a) -2 (b) 4 (c) 8 (d) 20
4. If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k =$ ....
   (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$
5. If $5^{x-3} = 1$, then $2x^2 =$ ....
   (a) 36 (b) 9 (c) 18 (d) 3
6. If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. , then its length is .... cm.
   (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

---

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :** $x(x - 2) = 1$

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(x)$ in the simplest form , showing the domain.

---

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$ **, find the value of each of a and b**

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form , showing the domain.

---

4 [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$ **, find each of the following :**

1. $P(A \cap B)$
2. $P(B - A)$
3. $P(A \cup B)'$

5 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 3 \quad , \quad y^2 - xy = 21$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically :** $y = x + 4 \quad , \quad x + y = 4$

Answer the following questions :

1 Choose the correct answer from those given :

1. In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then P (A ∪ B) = ...
 (a) $\frac{1}{2}$ (b) 1 (c) zero (d) ∅

2. The number of solutions of the equation $X - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....
 (a) 1 (b) 2 (c) 3 (d) infinite

3. The set of zeroes of $f : f(X) = \frac{-3}{X - 2}$ is ....
 (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{3\}$ (c) $\{2\}$ (d) ∅

4. If the curve of the quadratic function f passes through the points $(-1 , 0)$, $(0 , -4)$, $(4 , 0)$, then the solution set of the equation $f(X) = 0$ in $\mathbb{R}$ is ....
 (a) $\{-1 , 0\}$ (b) $\{-4 , 0\}$ (c) $\{-1 , 4\}$ (d) $\{4 , -4\}$

5. If $2^{X+1} = 1$, then $X \in$ ....
 (a) $\{0\}$ (b) $\{0 , 1\}$ (c) $\{-1\}$ (d) $\mathbb{R} - \{-1\}$

6. If $\sqrt{x^2} = 25$, then $X =$ ....
 (a) 5 (b) ± 5 (c) 25 (d) ± 25

2 [a] If A , B are two events in a random experiment and P (A) = 0.6 , P (B) = 0.5 , P (A ∩ B) = 0.3 , **find :** P (A ∪ B) , P ($\grave{B}$)

[b] **Simplify to the simplest form , showing the domain :**

$$n(X) = \frac{X^3 - 1}{X^2 - 2X + 1} \times \frac{2X - 2}{X^2 + X + 1}$$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$3X^2 - 6X = -1$ (approximating the result to the nearest two decimals)

[b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(X) = \frac{X - 1}{X^2 - aX + 9}$, find the value of a

4 [a] **Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:**

$y - X = 2$, $X^2 + Xy - 4 = 0$

[b] **Find n (X) in the simplest form , showing the domain of n :**

$$n(X) = \frac{X - 3}{X^2 - 7X + 12} - \frac{X - 3}{3 - X}$$

5 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°

Find the measure of each angle.

[b] If $n(X) = \dfrac{X^2 - 2X}{(X-2)(X^2+2)}$ **, find :**

1 $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}

2 The value of X if $n^{-1}(X) = 3$

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0, 2\}$

2 If A and B are two mutually exclusive events from the sample space S of a random experiment , then P (A – B) = ...

(a) P (B) (b) P (A) (c) $P(\acute{A})$ (d) $P(\acute{B})$

3 In the equation : $a x^2 + b x + c = 0$, if : $b^2 - 4ac > 0$, then the equation has .... roots in $\mathbb{R}$

(a) 1 (b) 2 (c) zero (d) ∞

4 The rule which describes the pattern $\left(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, ...\right)$ where $n \in \mathbb{Z}_+$ is ....

(a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

5 If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 6 (d) 5

6 If $3^x = 4$, $4^y = 12$, then $\frac{xy}{x+1} =$ ....

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

---

2 [a] If A , B are two events from the sample space of a random experiment and

P (A) = 0.7 , P (B) = 0.5 and $P(A \cap B) = 0.3$

, **find :** $P(\acute{A})$, P (A – B) and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(x) = x^2 - 10x + a$ is $\{5\}$

, then find the value of a

---

3 [a] **Find the S.S. in $\mathbb{R}^2$ of the two equations :** $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$,

prove that : $n_1 = n_2$

---

4 [a] **Find n (x) in the simplest form and state the domain if :**

$$n(x) = \frac{x^2 - 3x}{2x^2 - x - 6} \div \frac{2x^2 - 3x}{4x^2 - 9}$$

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$x + 2y = 8$, $3x + y = 9$

5 [a] Using the general rule , find the solution set of the following equation in $\mathbb{R}$:

$2x^2 - 5x + 1 = 0$

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$

Answers of model 1

1

1 d　　2 a　　3 b

4 c　　5 c　　6 c

2

[a] $\because x(x-2)=1$　　$\therefore x^2-2x-1=0$

$\therefore a=1, b=-2, c=-1$

$\therefore x=\dfrac{2\pm\sqrt{(-2)^2-4\times1\times(-1)}}{2\times1}$

$=\dfrac{2\pm\sqrt{8}}{2}=\dfrac{2\pm2\sqrt{2}}{2}=1\pm\sqrt{2}$

$\therefore x=1+\sqrt{2}$ or $x=1-\sqrt{2}$

$\therefore$ The S.S. $=\{1+\sqrt{2}, 1-\sqrt{2}\}$

[b] $\because n(x)=\dfrac{x(x^2+1)}{x^2+1}+\dfrac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2\}$

$, n(x)=x+\dfrac{1}{x-2}=\dfrac{x(x-2)+1}{x-2}$

$=\dfrac{x^2-2x+1}{x-2}=\dfrac{(x-1)^2}{x-2}$

3

[a] $\because z(f)=\{3\}$　　$\therefore$ At $x=3$

$\therefore x^2-ax+9=0$　　$\therefore 3^2-a\times3+9=0$

$\therefore 9-3a+9=0$　　$\therefore -3a=-18$　　$\therefore a=6$

$, \because$ The domain of $f=\mathbb{R}-\{2\}$

$\therefore$ At $x=2$　　$\therefore bx+4=0$

$\therefore 2b+4=0$　　$\therefore 2b=-4$　　$\therefore b=-2$

[b] $\because n(x)=\dfrac{(x-2)(x^2+2x+4)}{(x-2)(x-1)}\div\dfrac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2, 1, 0, -\frac{3}{2}\}$

$, n(x)=\dfrac{x^2+2x+4}{x-1}\times\dfrac{(2x+3)(x-1)}{x(x^2+2x+4)}=\dfrac{2x+3}{x}$

4

[a] $\because n_1=\dfrac{(x+3)(x+2)}{(x+2)(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1=\mathbb{R}-\{-2, 1\}\\ , n_1(x)=\dfrac{x+3}{x-1}\end{array}\right\}$ (1)

$, \because n_2(x)=\dfrac{(x-5)(x+3)}{(x-5)(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2=\mathbb{R}-\{5, 1\}\\ , n_2(x)=\dfrac{x+3}{x-1}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1\neq n_2$

because the domain of $n_1\neq$ the domain of n_2

[b] 1 $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=\frac{1}{4}+\frac{1}{2}-\frac{5}{8}=\frac{1}{8}$

2 $P(B-A)=P(B)-P(A\cap B)=\frac{1}{2}-\frac{1}{8}=\frac{3}{8}$

3 $P(A\cup B)'=1-P(A\cup B)=1-\frac{5}{8}=\frac{3}{8}$

5

[a] $\because x-y=3$　　$\therefore x=y+3$　　(1)

$, y^2-xy=21$　　(2)

substituting from (1) in (2) :

$\therefore y^2-(y+3)y=21$　　$\therefore y^2-y^2-3y=21$

$\therefore -3y=21$　　$\therefore y=-7$

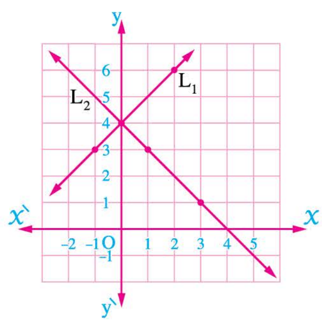
substituting in (1) : $\therefore x=-4$

$\therefore$ The S.S. $=\{(-4, -7)\}$

[b] $y=x+4$　　,　　$x=4-y$

x	−1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : $\therefore$ The S.S. $=\{(0, 4)\}$

Answers of model 2

1

1 b　　2 d　　3 d

4 c　　5 c　　6 d

2

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.5 - 0.3 = 0.8$

$\because P(\grave{B}) = 1 - P(B) \qquad \therefore P(\grave{B}) = 1 - 0.5 = 0.5$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] $\because 3x^2 - 6x + 1 = 0$

$\therefore a = 3$, $b = -6$, $c = 1$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$

$= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$

$\therefore x \approx 1.82$ or $x \approx 0.18$

The S.S. $= \{1.82 , 0.18\}$

[b] $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore$ At $x = 3 \qquad \therefore x^2 - a x + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \qquad \therefore -3a = -18 \qquad \therefore a = 6$

4

[a] $\because y - x = 2 \qquad \therefore y = x + 2$ (1)

, $x^2 + x y - 4 = 0$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + x(x+2) - 4 = 0$

$\therefore x^2 + x^2 + 2x - 4 = 0$

$\therefore 2x^2 + 2x - 4 = 0$ (Dividing by 2)

$\therefore x^2 + x - 2 = 0$

$(x - 1)(x + 2) = 0$

$\therefore x = 1$ or $x = -2$

Substituting in (1) : $\therefore y = 3$ or $y = 0$

$\therefore$ The S.S. $= \{(1 , 3) , (-2 , 0)\}$

[b] $\because n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , 3\}$

, $n(x) = \frac{1}{x-4} + 1 = \frac{1+x-4}{x-4} = \frac{x-3}{x-4}$

5

[a] Let the measure of the first angle be $x°$

, the measure of the second angle be $y°$

$\therefore x + y = 90°$ (1)

, $x - y = 50°$ (2)

Adding (1) and (2) : $\therefore 2x = 140° \qquad \therefore x = 70°$

Substituting in (1) : $\therefore y = 20°$

$\therefore$ The measures of the two angles are 70° , 20°

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2\}$

, $n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x) = 3 \qquad \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 - 3x + 2 = 0 \qquad \therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

Answers of model 3

1

1 d 2 b 3 b

4 c 5 b 6 b

2

[a] $P(\grave{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

$P(A - B) = P(A) - P(A \cap B)$

$= 0.7 - 0.3 = 0.4$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

[b] $\because z(f) = \{5\} \qquad \therefore$ At $x = 5$

$\therefore x^2 - 10x + a = 0 \qquad \therefore (5)^2 - 10 \times 5 + a = 0$

$\therefore 25 - 50 + a = 0 \qquad \therefore a = 25$

3

[a] $\because x + y = 2$ (1)

, $\frac{1}{x} + \frac{1}{y} = 2 \qquad \therefore x + y = 2xy$ (2)

Substituting in (1) from (2) : $\therefore 2 = 2 x y$

$\therefore x y = 1$ $\therefore x = \frac{1}{y}$

Substituting in (1) : $\therefore \frac{1}{y} + y = 2$

Multiplying by y : $\therefore 1 + y^2 = 2 y$

$\therefore y^2 - 2 y + 1 = 0$ $\therefore (y - 1)^2 = 0$

$\therefore y = 1$

Substituting in (1) : $\therefore x = 1$

$\therefore$ The S.S. $= \{(1 , 1)\}$

[b] $\because n_1 (x) = \frac{x^2}{x^2 (x - 1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$
$\therefore n_1 (x) = \frac{1}{x - 1}$ } (1)

$, \because n_2 (x) = \frac{x (x^2 + x + 1)}{x (x^3 - 1)}$

$= \frac{x (x^2 + x + 1)}{x (x - 1) (x^2 + x + 1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$
$, n_2 (x) = \frac{1}{x - 1}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because n (x) = \frac{x (x - 3)}{(2 x + 3) (x - 2)} \div \frac{x (2 x - 3)}{(2 x - 3) (2 x + 3)}$

$\therefore$ The domain of $n = \mathbb{R} - \left\{-\frac{3}{2} , 2 , 0 , \frac{3}{2}\right\}$

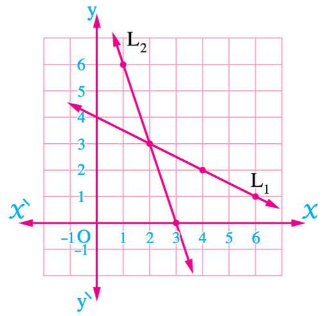
$, n (x) = \frac{x (x - 3)}{(2 x + 3) (x - 2)} \times \frac{(2 x - 3) (2 x + 3)}{x (2 x - 3)}$

$= \frac{x - 3}{x - 2}$

[b] $x = 8 - 2 y$ $, y = 9 - 3 x$

x	6	4	2
y	1	2	3

x	1	2	3
y	6	3	0



From the graph : $\therefore$ The S.S. $= \{(2 , 3)\}$

5

[a] $\because 2 x^2 - 5 x + 1 = 0$

$\therefore a = 2 , b = -5 , c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore$ The S.S. $= \left\{\frac{5 + \sqrt{17}}{4} , \frac{5 - \sqrt{17}}{4}\right\}$

[b] $\because n (x) = \frac{x (x + 2)}{(x + 2) (x - 2)} - \frac{2 (x - 3)}{(x - 2) (x - 3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 2 , 3\}$

$, n (x) = \frac{x}{x - 2} - \frac{2}{x - 2} = \frac{x - 2}{x - 2} = 1$

Model Examinations of the School Book on Algebra and Probability

Model 1

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

1 The domain of the function n : $n(x) = \frac{x}{x-1}$ is ....

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the two equations : $x + y = 2$ and $y + x = 3$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero (b) 1 (c) 2 (d) 3

3 If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} =$ ....

(a) – 5 (b) – 1 (c) 1 (d) 5

4 If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is ....

(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

5 The equation of the symmetric axis of the curve of the function f where $f(x) = x^2 - 4$ is ....

(a) $x = -4$ (b) $x = 0$ (c) $y = 0$ (d) $y = -4$

6 If $A \subset S$ of random experiment and $P(\grave{A}) = 2\,P(A)$, then $P(A) =$ ....

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**
$2x^2 - 5x + 1 = 0$ "approximate the result to the nearest one decimal".

[b] **Find n (x) in the simplest form showing the domain where :**

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**
$x - y = 0$ and $x^2 + xy + y^2 = 27$

[b] **Find n (x) in the simplest form showing the domain where :**

$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x+3}{x^2 + 3x + 9}$ then find n (2) , n (– 3) if possible.

4 [a] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm. , find the area of the rectangle.

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$,

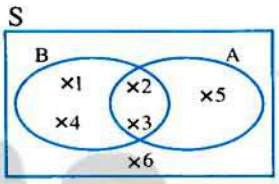
1 Find $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

2 If $n^{-1}(X) = 3$, then find the value of X

5 [a] If $n_1(X) = \frac{X^2}{X^3 - X^2}$ and $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$ **, then prove that :** $n_1 = n_2$

[b] **In the opposite figure :**

If A and B are two events in a sample space S of a random experiment **, then find :**



1 P (A ∩ B)

2 P (A – B)

3 The probability of non-occurrence of the event A

Model 2

Answer the following questions :

1 **Choose the correct answer :**

1 The solution set of the two equations : $X = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) {(3 , 4)} (b) {(4 , 3)} (c) $\mathbb{R}$ (d) ∅

2 The set of zeroes of the function f where $f(X) = X^2 + 4$ in $\mathbb{R}$ is ....

(a) {2} (b) {2 , – 2} (c) $\mathbb{R}$ (d) ∅

3 If A and B are two mutually exclusive events of a random experiment , then P (A ∩ B) = ...

(a) 0 (b) 1 (c) 0.5 (d) ∅

4 The domain of the multiplicative inverse of the function $f : f(X) = \frac{X + 2}{X - 3}$ is ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2 , 3\}$ (c) $\mathbb{R} - \{-3\}$ (d) $\mathbb{R}$

5 The two straight lines : $3X + 5y = 0$, $5X - 3y = 0$ are intersect in ....

(a) first quadrant. (b) second quadrant. (c) the origin point. (d) fourth quadrant.

6 If P (A) = 0.6 , then P (Ả) = ...

(a) 0.4 (b) 0.6 (c) 0.5 (d) 1

2 [a] **Find in $\mathbb{R}$ the solution set of the equation : $3x^2 - 5x + 1 = 0$**

by using the formula "approximate the result to the nearest two decimal places".

[b] **Simplify :**

$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$, showing the domain of n.

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 1$, $x^2 + y^2 = 25$

[b] If A and B are two events of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

Find : 1 $P(A \cup B)$ 2 $P(A - B)$

4 [a] **Solve the following two equations in $\mathbb{R} \times \mathbb{R}$:** $2x - y = 3$, $x + 2y = 4$

[b] **Simplify :**

$n(x) = \frac{x^2 + 3x}{x^2 - 9} \div \frac{2x}{x + 3}$, showing the domain of n.

5 [a] **Simplify :**

$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x + 3}{x^2 - 5x + 6}$, showing the domain of n.

[b] Graph the function f where $f(x) = x^2 - 1$, $x \in [-3, 3]$, from the graph find in $\mathbb{R}$ the solution set of the equation : $x^2 - 1 = 0$

Governorates' Examinations on Algebra and Probability

1 Cairo Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1. If the two equations $x + 3y = 6$, $2x + my = 12$ have an infinite number of solutions , then m = ...
(a) 1 (b) 2 (c) 3 (d) 6

2. If $2^{k-3} = 1$, then k = ...
(a) – 3 (b) zero (c) 3 (d) 8

3. The set of zeroes of the function $f : f(x) =$ zero is ....
(a) $\mathbb{R} - \{0\}$ (b) $\varnothing$ (c) $\{0\}$ (d) $\mathbb{R}$

4. If $x^2 + ax - 4 = (x + 2)(x - 2)$, then a = ...
(a) – 2 (b) zero (c) 2 (d) 4

5. If the two events A , B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B)$ = ...
(a) 1 (b) $\frac{1}{2}$ (c) $\varnothing$ (d) zero

6. If $|x| = 7$, then x = ...
(a) 7 (b) – 7 (c) ± 7 (d) 14

2 **[a]** Two real numbers their sum is 40 , and the difference between them is 10 , find the two numbers.

[b] Find n (x) in the simplest form , showing the domain where : $n(x) = \frac{x}{x-2} - \frac{2x+4}{x^2-4}$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**

$x - 3 = 0$, $x^2 + y^2 = 25$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^2 + x + 1}{x^3 - 1}$

, prove that : $n_1(x) = n_2(x)$ for all the values of x which belong to the common domain and find this domain.

4 **[a] Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$

[b] Find algebraically in $\mathbb{R}$ the solution set of the equation : $2x^2 + 5x - 6 = 0$, approximating the results to the nearest one decimal place.

5 [a] If A , B are two events of the sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.5$, $P(A \cap B) = 0.3$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$

[b] If $n(x) = \frac{x}{x+3}$

1 Find $n^{-1}(x)$, showing the domain of n^{-1} 2 If $n^{-1}(x) = 4$, find the value of x

2 Giza Governorate

Answer the following questions :

1 Choose the correct answer from the given ones :

1 If the perimeter of a square is 16 cm. , then its area = …………… cm^2.

(a) 4 (b) 8 (c) 16 (d) 64

2 The domain of the function n : $n(x) = \frac{x}{x^2 - 1}$ is ……………

(a) $\{-1\}$ (b) $\mathbb{R} - \{1\}$ (c) $\{1, -1\}$ (d) $\mathbb{R} - \{1, -1\}$

3 If $\frac{1}{3}x = 2$, then $\frac{1}{2}x =$ ……………

(a) 2 (b) 3 (c) 6 (d) 8

4 The number of solutions of the two equations $x + y = 1$, $x + y = 2$ together in $\mathbb{R} \times \mathbb{R}$ is ……………

(a) zero (b) 1 (c) 2 (d) 3

5 If $x^2 + kx + 81$ is a perfect square , then k = ……………

(a) ± 6 (b) ± 9 (c) ± 18 (d) ± 81

6 If $A \subset S$ of a random experiment , $P(A) + P(\grave{A}) = 2k$, then k = ……………

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

2 [a] By using the formula find in $\mathbb{R}$ the solution set of the equation :

$2x^2 - 5x + 1 = 0$ rounding the results to two decimal places.

[b] Find n (x) in its simplest form where :

$n(x) = \frac{x^2 - 4}{x^3 - 8} \div \frac{x^2 - x - 6}{x^2 + 2x + 4}$, showing the domain.

3 **[a]** A right-angled triangle of hypotenuse length 10 cm. and its perimeter is 24 cm. Find the lengths of the other two sides.

[b] If A , B are two mutually exclusive events of a random experiment , P (A) = 0.2 , P (B) = 0.5 , **find :** P (A ∪ B) and P (A − B)

4 **[a]** If $n(x) = \frac{x^2 - 3x}{x^2 - 5x + 6}$

, **find :** **1** $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 2$

[b] Find the solution set for the following equations algebraically in ℝ × ℝ :

$x + 2y = 4$, $3x - y = 5$

5 **[a]** If $n(x) = \frac{x^2}{x-1} + \frac{x}{1-x}$, then find $n(x)$ in the simplest form , showing the domain.

[b] If $n_1(x) = \frac{x^2 + x - 6}{x^2 - 4}$, $n_2(x) = \frac{x^2 - 9}{x^2 - x - 6}$, then show whether $n_1 = n_2$ or not and why.

3 Alexandria Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The set of zeroes of the function f where $f(x) = x + 4$ in ℝ is ....

(a) {4 , − 4} (b) {− 4} (c) ℝ (d) ∅

2 If $x^3 y^{-3} = 8$, then $\frac{y}{x} =$ ....

(a) $\frac{1}{512}$ (b) $\frac{1}{8}$ (c) 2 (d) $\frac{1}{2}$

3 The equation of the symmetric axis of the curve of the function f where $f(x) = x^2 - 4$ is ....

(a) $x = -4$ (b) $x =$ zero (c) y = zero (d) y = − 4

4 The solution set of the equation : $x^2 = 9$ in ℚ is ....

(a) {− 3} (b) {3} (c) ∅ (d) {− 3 , 3}

5 If A ⊂ S of a random experiment and P (Ā) = 2 P (A) , then P (A) = ...

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

6 $\frac{5^{x+2}}{5^{x+1}} =$ ....

(a) 5 (b) 10 (c) 15 (d) 20

2 **[a] Find the solution set of the two equations :**

$x - y = 0$ and $x^2 + xy + y^2 = 27$ in $\mathbb{R} \times \mathbb{R}$

[b] Find the common domain for which $n_1(x)$ and $n_2(x)$ are equal , where :

$n_1(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}$, $n_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$

3 **[a] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$2x^2 + 5x = 0$

[b] Find n (x) in the simplest form , showing the domain where :

$n(x) = \frac{x^3 - 1}{x^2 - x} \times \frac{x + 3}{x^2 + x + 1}$

4 **[a] Find algebraically the solution set of the two equations :**

$2x + y = 1$, $x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

[b] Find n (x) in the simplest form , showing the domain where :

$n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$

5 [a] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1. Find $n^{-1}(x)$ in the simplest form , showing the domain on n^{-1}
2. If $n^{-1}(x) = 3$, then find the value of x

[b] If A and B are two mutually exclusive events of a random experiment and

$P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, **find :** P (B)

4 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer :**

1. If $x^2 + kx - 21 = (x - 3)(x + 7)$, then k = ...

   (a) – 2 (b) 4 (c) 8 (d) 20

2. One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is ....

   (a) (– 4 , 2) (b) (2 , – 4) (c) (3 , 1) (d) (4 , 2)

3. If $5^{x - 3} = 1$, then $2x^2$ = ...

   (a) 36 (b) 9 (c) 18 (d) 3

4 If $A \cap B = \varnothing$, then $P(A - B) = \dots\dots$
(a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1

5 If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. , then its length is .... cm.
(a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

6 If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k = \dots\dots$
(a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$

2 [a] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$
, **find :** 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A

[b] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm. , find the area of the rectangle.

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$, $x^2 + xy + y^2 = 27$

[b] **Find n (x) in the simplest form , showing the domain :** $n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$

4 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $2x^2 - 4x + 1 = 0$
approximating the results to one decimal place. (using the general rule)

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, **prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form , showing the domain :**
$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 - 9}{x^2 + x - 6}$

[b] If the domain of the function f where $f(x) = \frac{x}{x^2 - 5x + m}$ is $\mathbb{R} - \{2, k\}$, then find the value of each of m and k

5 El-Sharkia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from the given ones :**

1 If the domain of the fractional function n (x) is $\mathbb{R} - \{2, 3, 4\}$, then $n(3) = \dots\dots$
(a) 3 (b) 2 (c) 4 (d) not exist

2 If $x^2 + y^2 = 5$, $xy = 2$ where $x \in \mathbb{R}$, $y \in \mathbb{R}$, then $(x + y)^2 = \dots\dots$
(a) 7 (b) 9 (c) 5 (d) 13

3 The point (2 , – 1) does not belong to the straight line whose equation is ....

(a) $x + y = 1$ (b) $x - y = 3$ (c) $x = 2$ (d) $y = 5$

4 If $n(x) = \frac{x}{x-1}$, then the domain of n^{-1} is ....

(a) $\mathbb{R} - \{1 , 0\}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{1\}$ (d) $\{1 , 0\}$

5 The two straight lines $L_1 : 3x + 7y = 0$ and $L_2 : 5x + 9y = 0$ are intersecting in the ....

(a) third quadrant. (b) fourth quadrant. (c) first quadrant. (d) origin point.

6 If A , B are two events from the sample space of a random experiment and $A \subset B$, which of the following expressions is false ?

(a) $P(A \cup B) = P(B)$ (b) $P(A \cap B) = P(A)$

(c) $P(A - B) = \text{zero}$ (d) $P(A - B) = P(B)$

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :** $x(x-2) = 1$

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find n (x) in the simplest form , showing the domain.

3 [a] **Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations :** $2x - y = 3$, $x + 2y = 4$

[b] If $n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} \div \frac{10 - 2x}{x^2 - 6x + 9}$

, find n (x) in the simplest form , showing the domain.

4 [a] **Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:**

$x + 2y = 2$, $x^2 + 2xy = 2$

[b] If $n_1(x) = 1 - \frac{1}{x}$, $n_2(x) = \frac{1 - x}{x}$, show whether $n_1 = n_2$ or not.

5 [a] In a random experiment , a regular dice is rolled once and observing the upper face.

If : **A :** The event of getting an even number.

B : The event of getting a prime number.

, find : P (A) , P (B) , $P(A \cup B)$

[b] If $n(x) = \frac{k}{x} + \frac{9}{x + m}$ where the domain of n is $\mathbb{R} - \{0 , 4\}$, and n (5) = 2

, find the value of each of : m , k

6 El-Monofia Governorate

Answer the following questions : ***(Using calculator is permitted)***

1 Choose the correct answer from those given :

1 $4^{15} + 4^{15} =$ ....

(a) 4^{30} (b) 4^{zero} (c) 8^{15} (d) 2^{31}

2 The necessary numbers to complete the pattern :

$\frac{1}{5}$, 0.4 , $\frac{3}{5}$, ... , ... , ... , $\frac{7}{5}$ is ....

(a) 0.8 , $\frac{6}{5}$, 1.2 (b) 0.8 , 1 , 1.2 (c) 0.6 , 0.8 , 1 (d) 0.8 , 1 , 4.1

3 The multiplicative inverse of the number $1 - \sqrt{2}$ is ....

(a) $1 + \sqrt{2}$ (b) $\sqrt{2} - 1$ (c) $-\left(1 + \sqrt{2}\right)$ (d) $\frac{1 + \sqrt{2}}{2}$

4 The domain of the function $n^{-1}(x) = \frac{x + 4}{x - 4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{4\}$ (c) $\mathbb{R} - \{-4\}$ (d) $\mathbb{R} - \{4 , -4\}$

5 The two straight lines : $3x - 5y = 0$, $5x + 3y = 0$ intersect at the ....

(a) 1st quadrant. (b) 3rd quadrant. (c) origin point. (d) 4th quadrant.

6 If $P(A) = 3 P(\acute{A})$, then $P(A) =$ ....

(a) $\frac{3}{4}$ (b) 1 (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$2x - y = 3$, $x + 2y = 4$

[b] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :**

$3x^2 = 5x - 1$ rounding the result to the nearest two decimal digits.

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$ **, find the value of each of a and b**

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form , showing the domain.

4 [a] If $n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$, find $n(x)$ in the simplest form , showing the domain , then find n (4) if it is possible.

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + y = 4$, $\frac{1}{x} + \frac{1}{y} = 1$, where $x \neq 0 , y \neq 0$

5 [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, **find each of the following :**

1 $P(A \cap B)$ 2 $P(B - A)$ 3 $P(A \cup B)'$

7 El-Gharbia Governorate

Answer the following questions :

1 Choose the correct answer :

1 If $2^{x+1} = 1$, then $x \in$ ....

(a) $\{0\}$ (b) $\{0 , -1\}$ (c) $\{-1\}$ (d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) 1 (b) 2 (c) 3 (d) infinite

3 In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then $P(A \cup B) =$ ....

(a) $\frac{1}{2}$ (b) 1 (c) zero (d) $\varnothing$

4 The set of zeroes of $f : f(x) = \frac{-3}{x - 2}$ is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{3\}$ (c) $\{2\}$ (d) $\varnothing$

5 If the curve of the quadratic function f passes through the points $(-1 , 0)$, $(0 , -4)$, $(4 , 0)$, then the solution set of the equation $f(x) = 0$ in $\mathbb{R}$ is ....

(a) $\{-1 , 0\}$ (b) $\{-4 , 0\}$ (c) $\{-1 , 4\}$ (d) $\{4 , -4\}$

6 If $\sqrt{x^2} = 25$, then $x =$ ....

(a) 5 (b) ± 5 (c) 25 (d) ± 25

2 [a] If A and B are two events in the sample space of a random experiment and $P(A) = 0.5$, $P(A \cup B) = 0.8$, $P(B) = x$, $P(A \cap B) = 0.1$

Find the value of : x and $P(A - B)$

[b] If $n(x) = x + \frac{x}{x - 2}$, find $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

3 [a] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x}{x - 2} - \frac{x}{x + 2}$

[b] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 3$, $y^2 - xy = 21$

4 **[a] By using the general rule and without using the calculator , find in $\mathbb{R}$ the solution set of the equation :** $x^2 + 2x - 4 = 0$ in the simplest form.

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$, is $n_1 = n_2$? With the reason.

5 **[a] Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^3 - 1}{x^2 - x} \div \frac{x^2 + x + 1}{x + 3}$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically : $y = x + 4$, $x + y = 4$

8 El-Dakahlia Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **[a] Choose the correct answer from the given ones :**

1. The solution set of the two equations $x - 3 = 0$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $\{3 , 4\}$ (b) $\{(3 , 4)\}$ (c) $\{(4 , 3)\}$ (d) $\varnothing$
2. If A , B are two events in a random experiment , $A \subset B$, then $P(A \cup B) =$ ....
   (a) P (B) (b) P (A) (c) $P(A \cap B)$ (d) 0
3. If $3^y \times 5^y = 225$, then y = ...
   (a) 2 (b) 15 (c) 0 (d) 20

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the equations : $3x - y = 5$ and $x + 2y = 4$

2 **[a] Choose the correct answer from the given ones :**

1. The domain of the additive inverse of the function n : $n(x) = \frac{x + 2}{x - 3}$ is ....
   (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{-2 , 3\}$ (d) $\mathbb{R}$
2. The set of zeroes of the function $f : f(x) = x^2 + 9$ in $\mathbb{R}$ is ....
   (a) $\mathbb{R}$ (b) $\{3\}$ (c) $\{3 , -3\}$ (d) $\varnothing$
3. The curve $y = a x^2 + b x + c$ cuts y-axis at the point ....
   (a) (0 , b) (b) (b , 0) (c) (c , 0) (d) (0 , c)

[b] Find n (x) in the simplest form , showing the domain : $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$

3 **[a]** If A , B are two events in a random experiment and P (A) = 0.6 , P (B) = 0.5 , $P(A \cap B) = 0.3$, **find :** $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

4 **[a]** If $n_1(x) = \frac{x^2 - x}{x^3 - 2x^2}$, $n_2(x) = \frac{x^2 - 3x + 2}{x^3 - 4x^2 + 4x}$ **, prove that :** $n_1 = n_2$

[b] By using the general rule , find the solution set of the equation :
$2x^2 - 4x + 1 = 0$ in $\mathbb{R}$, rounding the results to two decimal places.

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$ and $x = \frac{4}{y}$ algebraically.

[b] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1. Find : $n^{-1}(x)$ and identify the domain of n^{-1}
2. If $n^{-1}(x) = 3$, what is the value of x ?

9 Ismailia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1. If x is the additive identity element , y is the multiplicative identity element , then $2^x + 3^y =$ ……………
   (a) 2 (b) 3 (c) 4 (d) 5
2. The set of zeroes of the function $f : f(x) = 2x - 6$ is ……………
   (a) {1} (b) {3} (c) {5} (d) {7}
3. If $\sqrt{x} = 2$, then $\frac{1}{2} x =$ ……………
   (a) 8 (b) 6 (c) 4 (d) 2
4. The number of solutions of the two equations : $2x - y = 3$, $x + 2y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ……………
   (a) 1 (b) zero (c) 2 (d) infinite.
5. If A , B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ……………
   (a) $\varnothing$ (b) 1 (c) zero (d) 0.5
6. If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 + 2 =$ ……………
   (a) 15 (b) 16 (c) 17 (d) 18

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**
$2x + y = 1$, $x + 2y = 5$

[b] If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$ **, prove that :** $n_1 = n_2$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**
$3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)

[b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x - 1}{x^2 - ax + 9}$, find the value of a

4 [a] Two numbers , their product is 10 and the difference between them is 3
Find the two numbers.

[b] **Find n (x) in the simplest form , showing the domain of n where :**
$n(x) = \frac{x^2 + 4x - 5}{x^3 - 8} \div \frac{x + 5}{x^2 + 2x + 4}$ **, then find :** n (3) , n (2) if it is possible.

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**
$n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x - 1}{x^2 + 2x - 3}$

[b] If A and B are two events in the sample space of a random experiment and
P (A) = 0.4 , P (B) = 0.5 and P (A ∩ B) = 0.2
, find : 1 P (A ∪ B)   2 P (A – B)

10 Suez Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from the given ones :**

1 The set of zeroes of f where $f(x) = x - 5$ is ....
(a) $\mathbb{R}$ (b) $\{-5\}$ (c) $\{5\}$ (d) ∅

2 If A ⊂ S of a random experiment , P (Ā) = P (A) , then P (A) = ...
(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

3 The solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x = 3$, $y = 4$ is ....
(a) $\{(3 , 4)\}$ (b) $\{(4 , 3)\}$ (c) $\mathbb{R}$ (d) ∅

4 If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is ....
(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

5 If $n(x) = \frac{x - 1}{x + 1}$, then the domain of n^{-1} = ...
(a) $\{-1\}$ (b) $\mathbb{R} - \{-1 , 1\}$ (c) $\mathbb{R} - \{-1\}$ (d) $\mathbb{R}$

6 If a – b = – 3 , then $(a - b)^2$ = ...
(a) – 9 (b) 12 (c) 9 (d) 18

2 [a] **Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the equations :** $x - y = 3$, $2x + y = 9$

(Explain your answer , showing the steps of the solution)

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :** $x - y = 0$, $xy = 9$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^2 + 2x - 3}{x + 3} \times \frac{x + 1}{x^2 - 1}$

4 [a] A and B are two events from the sample space of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

Find : 1 $P(A \cup B)$ 2 $P(\grave{A})$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$

5 [a] **Find the solution set for the following equation by using the formula in $\mathbb{R}$:**

$x^2 - 2x - 6 = 0$ (Rounding the results to two decimal places)

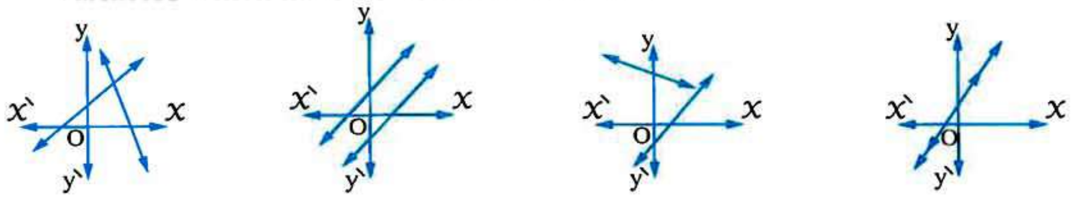
[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, **prove that :** $n_1 = n_2$

11 Port Said Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 Which of the following graphs represents two equations of the first degree in two variables which have no common solution ?



(a) (b) (c) (d)

2 The set of zeroes of the function $f : f(x) = x^2 + x + 1$ is ....

(a) $\{1\}$ (b) $\{-1\}$ (c) $\varnothing$ (d) $\{-1 , 1\}$

3 If the ratio between the perimeters of two squares is 3 : 4 , then the ratio between their areas is ....

(a) 3 : 4 (b) 9 : 16 (c) 16 : 9 (d) 4 : 3

4 If $A \subset S$ of a random experiment , $P(\acute{A}) = 2\,P(A)$, then $P(A) =$ ....

(a) 1 (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

5 If $n(x) = \frac{x-2}{x+5}$, then the domain of the function n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{2 , -5\}$

6 If a fair die is rolled once , then the probability of getting an even number and a prime number together equals ....

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) zero (d) 1

2 [a] If the domain of the function $n : n(x) = \frac{x-1}{x^2 - a x + 9}$ is $\mathbb{R} - \{3\}$, then find the value of a

[b] A rectangle is of perimeter 22 cm. and area 24 cm^2. Find its two dimensions.

3 **[a] Find in $\mathbb{R}$ by using the general formula the solution set of the equation :** $x^2 - 2x - 1 = 0$ approximating the results to the nearest one decimal digit.

[b] Find n (x) in the simplest form , showing the domain where :

$n(x) = \frac{x^2 + x + 1}{x} \div \frac{x^3 - 1}{x^2 - x}$

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + 3y = 7$, $5x - y = 3$

[b] Find n (x) in the simplest form , showing the domain where :

$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x - 3}{x^2 - 5x + 6}$

5 [a] A set of cards numbered from 1 to 20 and well mixed. If a card is drawn randomly **, find the probability that the drawn card is carrying :**

1 A number multiple of 4
2 A number multiple of 5
3 A number multiple of 4 or 5

[b] If $n_1(x) = \frac{x+3}{x^2 - 9}$, $n_2(x) = \frac{2}{2x - 6}$

, prove that : $n_1(x) = n_2(x)$ for the value of x which belong to the common domain and find the domain.

12 Damietta Governorate

Answer the following questions : ***(Calculators are allowed)***

1 Choose the correct answer from the given ones :

1 If there are an infinite number of solutions of the two equations : $x + 4y = 7$, $x + (k - 1)y = 7$ in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 5 (b) 7 (c) 12 (d) 13

2 If $B \subset A$, then $P(A \cup B) =$ ....

(a) 1 (b) P (A) (c) P (B) (d) 2 P (B)

3 If $x = 2$, $y = 3$, then $(y - 2x)^{10} =$ ....

(a) – 1 (b) zero (c) 5 (d) 1

4 If $ab = 3$, $ab^2 = 12$, then b = ...

(a) 4 (b) 2 (c) – 2 (d) ± 2

5 If 3 is one of zeroes of the function f where $f(x) = x^2 - 3x + c$, then c = ...

(a) 6 (b) 0 (c) – 6 (d) 3

6 If a , b , c are three rational numbers where a < b and c is a negative number , then ac .... bc

(a) > (b) = (c) ≤ (d) <

2 **[a] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :** $x + \frac{4}{x} = 6$, rounding the results to one decimal digit.

[b] Simplify : $n(x) = \frac{2x}{x - 3} \div \frac{x^2 + 2x}{x^2 - 9}$, showing the domain.

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :** $x + 2y = 4$, $2x - y = 3$

[b] Simplify : $n(x) = \frac{x^2 - 2x + 4}{x^3 + 8} + \frac{x^2 - 1}{x^2 + x - 2}$, showing the domain.

4 **[a]** If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$,

then prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 2$, $x^2 + y^2 = 20$

5 **[a]** If the domain of the function n : $n(x) = \frac{x + 1}{x^2 - a x + 25}$ is $\mathbb{R} - \{5\}$,

then find the value of a

[b] If A and B are two events from the sample space of a random experiment ,

$P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$

, find : 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A

13 Kafr El-Sheikh Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **[a] Choose the correct answer :**

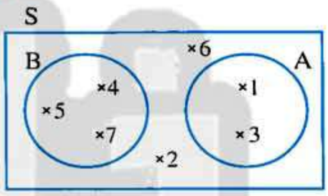
1 If there is only one solution for the two equations $x + 4y = 5$ and $3x + ky = 15$, then k can't equal ....

(a) -4 (b) 4 (c) 12 (d) -12

2 If $\sqrt{100 - 36} = 10 - a$, then a = ...

(a) 2 (b) 6 (c) 4 (d) 3

3 **In the opposite figure :**



If A and B are two events in the sample space S of a random experiment ,

then $P(B - A) =$ ....

(a) $\frac{1}{2}$ (b) $\frac{5}{7}$ (c) $\frac{2}{7}$ (d) $\frac{3}{7}$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x) = \frac{2x^2 - x - 6}{x^2 - 3x} \div \frac{4x^2 - 9}{2x^2 - 3x}$

2 **[a] Choose the correct answer :**

1 If the domain of the function n : $n(x) = \frac{x + 2}{4x^2 + kx + 9}$ is $\mathbb{R} - \{\frac{-3}{2}\}$, then the value of k = ...

(a) 15 (b) -15 (c) 12 (d) -12

2 If $6^x = 12$, then $6^{x+1} =$ ....

(a) 66 (b) 13 (c) 27 (d) 72

3 The S.S. of the inequality : $-x < 3$ in $\mathbb{R}$ is ....

(a) $[3 , \infty[$ (b) $]3 , \infty[$ (c) $]-3 , \infty[$ (d) $[-3 , \infty[$

[b] If $n_1(x) = \frac{x}{x^2 - x}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

3 **[a] Find in $\mathbb{R}$ the solution set of the equation :** $3x^2 + 1 = 5x$, rounding the results to two decimal places.

[b] If $n_1(x) = \frac{x^2 - 2x - 15}{x^2 - 9}$, $n_2(x) = \frac{6 - ax}{x^2 - 6x + 9}$, where the set of zeroes of n_2 is $\{-3\}$

1 Find the value of a

2 Find $n(x)$ where $n(x) = n_1(x) - n_2(x)$ in the simplest form , showing the domain of n

4 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$3x + 2y = 4$, $x - 3y = 5$

[b] If A and B are two events from the sample space S of a random experiment , $P(A) = \frac{1}{2}$, $2P(B) = P(\grave{B})$ **, then find $P(A \cup B)$ in each of the following cases :**

1 $P(A \cap B) = \frac{1}{6}$ 2 A , B are mutually exclusive events.

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - 2y - 1 = 0$, $x^2 - xy = 0$

[b] If $n(x) = \frac{x^2 - 3x}{(x - 3)(x^2 + 2)}$ **, then find :** $n^{-1}(x)$ and identify the domain of n^{-1}

14 El-Beheira Governorate

Answer the following questions : (Calculator is permitted)

1 **Choose the correct answer from the given ones :**

1 If $x^2 - y^2 = 12$, $x - y = 3$, then $x + y =$ ....

(a) 3 (b) 4 (c) 12 (d) 15

2 If $3a = \sqrt{4}\,b$, then $\frac{a}{b} =$ ....

(a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$

3 If $5x = 5^3$, then $\frac{4}{5}x =$ ....

(a) 10 (b) 15 (c) 20 (d) 25

4 The number of solution of the two equations $x + y = 1$ and $y + x = 2$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero (b) 1 (c) 2 (d) 3

5 The common domain of the functions n_1 , n_2 where $n_1(x) = \frac{x + 2}{x^2 - 4}$, $n_2(x) = \frac{1}{x + 1}$ is ....

(a) $\{-2, -1, 2\}$ (b) $\mathbb{R} - \{-1, 2\}$

(c) $\mathbb{R} - \{-2, -1, 2\}$ (d) $\mathbb{R}$

6 If $A \subset B$, then $P(A \cup B) =$ ....

(a) zero (b) P (A) (c) P (B) (d) $P(A \cap B)$

2 **[a] Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:**

$y - x = 2$, $x^2 + xy - 4 = 0$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$

3 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°
Find the measure of each angle.

[b] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$ **, find :**

1 $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$

4 **[a] By using the general formula , find the solution set of the following equation in $\mathbb{R}$:**

$3x^2 = 5x - 1$ (rounding the results to two decimal places).

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$ **, then prove that :** $n_1 = n_2$

5 **[a] Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$

[b] If A and B are two events from the sample space of a random experiment and

P (A) = 0.8 , P (B) = 0.7 , P (A ∩ B) = 0.6

, then find : 1 P (Á) 2 P (A ∪ B)

15 El-Fayoum Governorate

Answer the following questions : ***(Using calculators is allowed)***

1 **Choose the correct answer :**

1 In the equation : $ax^2 + bx + c = 0$, if : $b^2 - 4ac > 0$, then the equation has .... roots in $\mathbb{R}$

(a) 1 (b) 2 (c) zero (d) ∞

2 If $3^x = 4$, $4^y = 12$, then $\frac{xy}{x + 1} =$ ....

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

3 If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0 , 2\}$

4 If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 6 (d) 5

5 If A and B are two mutually exclusive events from the sample space S of a random experiment , then P (A – B) = ...

(a) P (A) (b) P (À) (c) P (B) (d) P (B̀)

6 The rule which describes the pattern $\left(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots\right)$ where $n \in \mathbb{Z}_+$ is ....

(a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

2 **[a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following pair of equations :**

$3x - y + 4 = 0$, $y = 2x + 3$

[b] Reduce $n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$ to the simplest form , showing the domain of n

3 **[a] By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**
$x^2 + 3x + 5 = 0$

[b] If $n(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x + 7}{x - 2}$, find the simplest form of n (x) , showing the domain , then find n (1)

4 [a] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$, show whether $n_1 = n_2$ or not. (give a reason)

[b] The sum of two real numbers is 9 , and the difference between their squares equals 45 , find the two numbers.

5 [a] If the set of zeroes of the function $f : f(x) = a x^2 + b x + 15$ is $\{3, 5\}$, find the values of a and b

[b] If A and B are two events of the sample space of a random experiment
, P (A) = P (À) , $P(A \cap B) = \frac{1}{16}$, $P(B) = \frac{5}{8} P(A)$
, find : 1 P (B) 2 $P(A \cup B)$

16 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 If a coin is tossed once , then the probability of appearing a tail equals ....

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) 1

2 The set of zeroes of the function f where $f(x) = \frac{x-3}{x-2}$ is ....

(a) {zero} (b) {2} (c) {3} (d) {2 , 3}

3 The equation $3x + 4y + x^2 y = 5$ is of the .... degree.

(a) zero (b) first (c) second (d) third

4 The domain of the function f where $f(x) = \frac{x-3}{2}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-2, 3\}$

5 If $x + y = xy = 10$, then $x^2 y + x y^2 =$ ....

(a) 10 (b) 20 (c) 30 (d) 100

6 The solution set of the two equations : $y = 4$, $x + y = 7$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) (3 , 4) (b) (4 , 3) (c) {(3 , 4)} (d) {(4 , 3)}

2 [a] **Find in $\mathbb{R}$ by using the general formula , the solution set of the equation :**

$x^2 - 2(x + 1) = 0$

[b] If $n_1(x) = \frac{5x}{5x + 25}$, $n_2(x) = \frac{x^2 + 5x}{x^2 + 10x + 25}$ **, then prove that :** $n_1 = n_2$

3 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x + y = 7$, $x^2 + y^2 = 25$

[b] **Find n (x) in its simplest form , showing the domain where :**

$n(x) = \frac{x^2}{x^2 - 3x} \div \frac{3x}{x^2 - 9}$

4 [a] If A , B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

, find : $P(\acute{A})$, $P(A - B)$ and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(x) = x^2 - 10x + a$ is {5}

, then find the value of a

5 [a] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$3x + y = 3$, $2x - y = 7$

[b] **Find n (x) in its simplest form , showing the domain where :**

$n(x) = \frac{x^2 + x + 1}{x^3 - 1} + \frac{x^2 - x - 2}{x^2 - 1}$

17 El-Menia Governorate

Answer the following questions : ***(Calculators are allowed)***

1 Choose the correct answer from those given :

1 If k < zero , which of the following quantities is the greatest in the numerical value ?

(a) 5 – k (b) 5 + k (c) 5 k (d) $\frac{5}{k}$

2 If a + b = 3 , $a^2 - a b + b^2 = 5$, then $a^3 + b^3 =$ ....

(a) 8 (b) 9 (c) 15 (d) 25

3 Half the number $4^6 =$ ....

(a) 2^3 (b) 2^6 (c) 4^3 (d) 2^{11}

4 The S.S of the two equations $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) {(3 , 4)} (b) {(4 , 3)} (c) $\mathbb{R}$ (d) $\varnothing$

5 If A , B are two mutually exclusive events from the sample space of a random experiment , then P (A ∩ B) = ...

(a) $\varnothing$ (b) zero (c) 0.5 (d) 1

6 The simplest form of the function $f : f(x) = \frac{2x}{x+1} + \frac{x}{x+1}$ is ....

(a) $\frac{3x}{x+1}$ (b) 3 (c) 2 (d) $\frac{2}{x+1}$

2 **[a] Find the S.S. in $\mathbb{R}$ for the equation :** $3x^2 - 5x + 1 = 0$, using the general rule , rounding the result to one decimal place.

[b] Find n (x) in the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 8}{x^2 - 5x + 6} \div \frac{x^2 + 2x + 4}{x - 3}$$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $2x + y = 1$, $x + 2y = 5$ algebraically.

[b] Find n (x) in the simplest form showing the domain where :

$$n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{10 - 2x}{x^2 - 8x + 15}$$

4 **[a] Find the S.S. in $\mathbb{R}^2$ of the two equations :** $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$,

prove that : $n_1 = n_2$

5 [a] If n $(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, **find :** $n^{-1}(x)$, showing the domain.

[b] If A , B are two events from the sample space of a random experiment , P (A) = 0.3 , P (B) = 0.6 , P (A ⋂ B) = 0.2

find : 1 P (A ⋃ B)   2 P (A – B)

18 Assiut Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 If $\frac{1}{3}x = 8$, then $\frac{1}{6}x =$ ....

(a) $\frac{4}{3}$ (b) 4   (c) 48   (d) 16

2 If there are an infinite number of solutions of the equations $x + 6y = 3$, $2x + ky = 6$ in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 4   (b) 6   (c) 12   (d) 21

3 The set of zeroes of the function *f* where $f(x) = x^2 - 3$ is ....

(a) $\{\sqrt{3}\}$ (b) $\{-\sqrt{3}\}$ (c) $\{3\}$ (d) $\{-\sqrt{3}, \sqrt{3}\}$

4 $\frac{3}{\sqrt{5}+\sqrt{2}} =$ ....

(a) $3\sqrt{5}$ (b) $2\sqrt{5}$ (c) $\sqrt{5}-\sqrt{2}$ (d) $\sqrt{5}+\sqrt{2}$

5 If the curve of the function *f* where $f(x) = x^2 - m$ passes through the point (3 , 0) , then m = ...

(a) 3   (b) – 3   (c) 6   (d) 9

6 If X ⊂ S and X̀ is the complementary event to event X , then P (X ⋂ X̀) = ...

(a) zero   (b) S   (c) ∅   (d) 1

2 [a] **Find the solution set of the two following equations algebraically in $\mathbb{R} \times \mathbb{R}$:**

$3x - y + 4 = 0$, $y = 2x + 3$

[b] If n $(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x+7}{x-2}$, then find n (x) in the simplest form and identify the domain and find n (1)

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x(x-1) = 5$, rounding the results to one decimal place.

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$

, prove that : $n_1(x) = n_2(x)$ for the values of x which belong to the common domain and find this domain.

4 **[a] Find in** $\mathbb{R} \times \mathbb{R}$ **the solution set of the two equations :** $x - y = 2$, $x^2 + y^2 = 20$

[b] If $Z(f) = \{5\}$, $f(x) = x^3 - 3x^2 + a$ **, find the value of :** a

5 **[a] Find n (x) in the simplest form , showing the domain of n :**

$n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{x - 3}{3 - x}$

[b] If $S = \{2, 3, 4, 5, 6, 7, 8\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$

, find : **1** P (A) , P ($\grave{B}$) **2** P (A ∪ B)

19 Souhag Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer :**

1 If $x \neq 0$, then $\frac{5x}{x^2 + 1} \div \frac{x}{x^2 + 1} =$ ....

(a) – 5 (b) – 1 (c) 1 (d) 5

2 $f : \mathbb{R} \longrightarrow \mathbb{R}$, $f(x) = a x^2 + b x + c$, where a , b , c ∈ $\mathbb{R}$, a = 0 , b ≠ 0 is a polynomial function of the .... degree in x

(a) second (b) third (c) first (d) zero

3 If $2^x = \frac{1}{4}$, then $x =$ ....

(a) 2 (b) – 2 (c) 1 (d) – 1

4 $\sqrt[3]{3\frac{3}{8}}$ .... $\sqrt{2\frac{1}{4}}$

(a) = (b) > (c) < (d) ≠

5 If there are an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$ of the two equations :

$x + 4y = 7$, $3x + ky = 21$, then k = ...

(a) 4 (b) 7 (c) 21 (d) 12

6 If A ⊂ S of a random experiment and P ($\grave{A}$) = 2 P (A) , then P (A) = ...

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) 1

2 **[a]** By using the general formula (rounding the results to one decimal digit) , find in $\mathbb{R}$ the solution set of the equation : $x(x-1)=4$

[b] If $n_1(x)=\frac{x^2}{x^3-x^2}$, $n_2(x)=\frac{x^3+x^2+x}{x^4-x}$, **prove that :** $n_1=n_2$

3 **[a] Find the solution set of the following equations in $\mathbb{R}\times\mathbb{R}$:**

$x-y=0$, $x^2+xy+y^2=27$

[b] If $n(x)=\frac{x^2-2x}{x^2-3x+2}$ **, then find :** $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

4 **[a] Solve in $\mathbb{R}\times\mathbb{R}$:** $2x-y=5$, $x+y=4$

[b] Simplify : $n(x)=\frac{x^2+2x}{x^2-4}-\frac{2x-6}{x^2-5x+6}$, showing the domain.

5 **[a] Simplify :** $n(x)=\frac{x^3-8}{x^2+x-6}\times\frac{x+3}{x^2+2x+4}$, showing the domain.

[b] If A , B are two mutually exclusive events of a random experiment and $P(A)=0.3$, $P(B)=0.6$, $P(A\cap B)=0.2$

, find : $P(\grave{A})$, $P(A\cup B)$

20 Qena Governorate

Answer the following questions : (Calculators are permitted)

1 **Choose the correct answer :**

1 The domain of the function f where $f(x)=\frac{x-2}{x^2+1}$ is ....

(a) $\mathbb{R}-\{-1\}$ (b) $\mathbb{R}-\{1,-1\}$ (c) $\mathbb{R}-\{1\}$ (d) $\mathbb{R}$

2 $10+(10)^2+(10)^3=$ ....

(a) 1000 (b) 3000 (c) 1110 (d) 1010

3 The two straight lines : $x-y=0$, $3x+2y=0$ intersect at the point ....

(a) (0 , 0) (b) (1 , 1) (c) (3 , 0) (d) (0 , 2)

4 $\sqrt{64+36}=8+$ ....

(a) 9 (b) 2 (c) 6 (d) 10

5 If $P(A)=3P(\grave{A})$, then $P(A)=$ ....

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{3}$

6 If $ab=3$, $ab^2=12$, then $b=$ ....

(a) 4 (b) 2 (c) -2 (d) ± 2

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - 2 = 0$, $y^2 - 3xy + 5 = 0$

[b] **Find n (x) in the simplest form , showing the domain where :** $n(x) = \frac{5}{x-3} + \frac{4}{3-x}$

3 [a] Graph the function f where $f(x) = x^2 - 2x + 3$ over the interval $[-1, 3]$, then from the graph find in $\mathbb{R}$ the solution set of the equation $x^2 - 2x + 3 = 0$

[b] If $n(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}$, find $n^{-1}(x)$, showing the domain of n^{-1} , then find $n^{-1}(0)$

4 [a] **Find in $\mathbb{R}$ the solution set of the equation :**

$2x^2 - 5x + 1 = 0$, approximating the results to two decimals.

[b] If $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$, **prove that :** $n_1 = n_2$

5 [a] If A and B are two events from the sample space S , P (A) = 0.8 , P (B) = 0.7 , $P(A \cap B) = 0.6$, **find :**

1 P (À) 2 $P(A \cup B)$ 3 P (A – B)

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$

21 Luxor Governorate

محافظة الأقصر

Answer the following questions :

1 Choose the correct answer :

1 If $f(x) = 9$, then $3 f(-x) =$ ....

(a) – 3 (b) 6 (c) – 12 (d) 27

2 The set of zeroes of f : $f(x)$ = zero is ....

(a) $\varnothing$ (b) $\mathbb{R}$ (c) $\mathbb{R} - \{0\}$ (d) zero

3 If $xy = 4$, $xz = 4$, $yz = 4$, where $x, y, z \in \mathbb{R}^+$, then $xyz =$ ....

(a) 64 (b) 12 (c) 8 (d) 4

4 If A , B are two events of the sample space of a random experiment , $A \subset B$, P (A) = 0.2 and P (B) = 0.6 , then P (B – A) = ...

(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

5 $\frac{1}{3}$ the number $(27)^3$ is ....

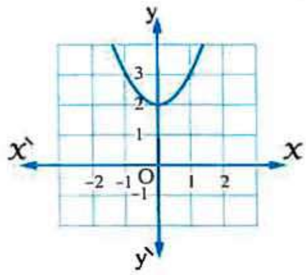
(a) 3^3 (b) 3^4 (c) 3^6 (d) 3^8

6 **From the opposite figure :**

The S.S. of $f(x) = 0$ in $\mathbb{R}$ is ……………

(a) $\varnothing$ (b) $\{2\}$

(c) $\{0\}$ (d) $\{(0, 2)\}$



2 [a] **Find the common domain of the functions defined by the following rules :**

$\frac{x-4}{x^2-5x+6}$, $\frac{2x}{x^3-9x}$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $y + 2x = 7$, $2x^2 + x + 3y = 19$

3 [a] **Find n (x) in the simplest form and state the domain :**

$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$

[b] A class has 40 students , 30 of them succeeded in math , 24 succeeded in science and 20 of them succeeded in both math and science. **If one student is chosen at random , find the probability that the student :**

1 Succeeded in math.

2 Succeeded in science only.

3 Succeeded in one of them at least.

4 [a] **Find in $\mathbb{R}$ the solution set of :** $2x^2 - x - 2 = 0$ by using the general rule where $(\sqrt{17} \simeq 4.12)$

[b] If $n_1(x) = \frac{x}{x^2-1}$, $n_2(x) = \frac{5x}{5x^2-5}$, **prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form and state the domain if :**

$n(x) = \frac{x^2-3x}{2x^2-x-6} \div \frac{2x^2-3x}{4x^2-9}$

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x + 2y = 8$, $3x + y = 9$

22 Aswan Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 The solution set of the two equations $x + y = 0$, $y - 5 = 0$ in $\mathbb{R} \times \mathbb{R}$ is ……………

(a) $\varnothing$ (b) $\mathbb{R}$ (c) $\{(-5, 5)\}$ (d) $\{(5, -5)\}$

2 If $2^3 \times 5^3 = 10^x$, then $x =$ ....

(a) zero (b) 3 (c) 6 (d) 9

3 If $a^2 - b^2 = 6$, $a - b = \sqrt{3}$, then $(a + b)^2 =$ ....

(a) 3 (b) 6 (c) 9 (d) 12

4 If $(5 , x - 4) = (y , 2)$, then $x + y =$ ....

(a) 6 (b) 8 (c) 11 (d) 25

5 If $f(x) = x^2 + x + a$ and the set of zeroes of the function f is $\{1 , -2\}$, then $a =$ ....

(a) 2 (b) 1 (c) -1 (d) -2

6 If $A \subset B$, then $P(A \cup B) =$ ....

(a) zero (b) P (A) (c) P (B) (d) $P(A \cap B)$

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$3x - y = -4$, $y - 2x = 3$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x + 3}{x^2 + 3x + 9}$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 1$, $x^2 + y^2 = 25$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$

, find : $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

4 **[a] Using the general rule , find the solution set of the following equation in $\mathbb{R}$:**

$2x^2 - 5x + 1 = 0$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$

5 [a] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$ **, prove that :** $n_1 = n_2$

[b] If A , B are two mutually exclusive events and $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$

, find : P (B)

23 New Valley Governorate

إيمان - عمل - تنمية

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer from those given :

1. The degree of the function $f : f(x) = x + x^2 - 5$ is the ....
   (a) first (b) second (c) third (d) fourth
2. The set of zeroes of the function $f : f(x) = 7$ is ....
   (a) $\varnothing$ (b) $\{7\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{7\}$
3. If a + b = 3 and (a + b) (a + 1) = 15 , then ab = ...
   (a) – 4 (b) 4 (c) – 6 (d) 6
4. The number of solutions of the equation : $x = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) zero (b) 1 (c) 2 (d) an infinite number.
5. If A and B are two mutually exclusive events of a random experiment , then : $P(A \cap B) =$ ....
   (a) P (A) (b) $\varnothing$ (c) zero (d) P (B)
6. If n_1 and n_2 are two algebraic fractions , the domain of $n_1 = \mathbb{R} - X_1$ (where X_1 is the set of zeroes of the denominator of n_1) and the domain of $n_2 = \mathbb{R} - X_2$ (where X_2 is the set of zeroes of the denominator of n_2) , then the common domain of n_1 and n_2 equals ....
   (a) $X_1 \cup X_2$ (b) $X_1 \cap X_2$
   (c) $(\mathbb{R} - X_1) \cup (\mathbb{R} - X_2)$ (d) $(\mathbb{R} - X_1) \cap (\mathbb{R} - X_2)$

2 **[a] Find n (x) in its simplest form, showing the domain of n :**

$$n(x) = \frac{x^2 - 4}{x^2 + 5x + 6}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$x^2 + y^2 = 17$, $y - x = 3$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :**

$3x - 2y = 4$, $x + 3y = 5$

[b] Find n (x) in its simplest form, showing the domain of n :

$$n(x) = \frac{x}{x + 2} \div \frac{x^2 - 2x}{\frac{1}{2}x^2 - 2}$$

4 **[a]** If $n_1(x) = \frac{x^3 - 1}{x^3 + x^2 + x}$, $n_2(x) = \frac{x^3 - x^2 + x - 1}{x^3 + x}$

, then prove that : $n_1 = n_2$

[b] Find n (x) in the simplest form, showing the domain of n :

$n(x) = \frac{3x}{x^2 - 3x} - \frac{x}{x - 3}$

5 **[a]** If A and B are two events from the sample space of a random experiment, and $P(A) = \frac{1}{5}$, $P(B) = \frac{3}{5}$, $P(A \cap B) = \frac{1}{10}$ **, then find :**

1 $P(\grave{A})$ 2 $P(A \cup B)$ 3 $P(B - A)$

[b] Draw the graph of the function $f : f(x) = x^2 - 2x + 1$ in the interval $[-2 , 4]$, then from the graph find in $\mathbb{R}$ the solution set of the equation : $x^2 - 2x + 1 = 0$

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If $\frac{x}{y} = \frac{3}{4}$, then $\frac{4x}{3y} =$ ....

(a) 1 (b) $\frac{4}{3}$ (c) $\frac{9}{16}$ (d) $\frac{16}{9}$

2 If $x^2 = 25$, then $x =$ ....

(a) – 5 (b) ± 5 (c) 5 (d) 10

3 If $x + 3y = 7$, then $x + 3(y + 5) =$ ....

(a) 3 (b) 7 (c) 22 (d) 21

4 The probability of the impossible event equals ....

(a) 1 (b) $\frac{1}{2}$ (c) – 1 (d) zero

5 The domain of $f : f(x) = \frac{x + 5}{x^2 - 4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-2 , 2\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{2\}$

6 If A and B are mutually exclusive events, then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) zero (c) 0.56 (d) 1

2 **[a] Find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 2x - 6 = 0$ by using the formula , approximating the result to the nearest two decimal places.

[b] Find n ($\mathcal{X}$) in the simplest form , showing the domain of n :

$$n(\mathcal{X}) = \frac{\mathcal{X}}{\mathcal{X}+2} + \frac{2\mathcal{X}^3}{\mathcal{X}^3 + 2\mathcal{X}^2}$$

3 **[a] Find n ($\mathcal{X}$) in the simplest form , showing the domain of n :**

$$n(\mathcal{X}) = \frac{\mathcal{X}^2 + 2\mathcal{X}}{\mathcal{X}^3 - 8} \times \frac{\mathcal{X}^2 + 2\mathcal{X} + 4}{\mathcal{X}+2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically :

$2\mathcal{X} - y = 3$, $\mathcal{X} + 2y = 4$

4 [a] If $n_1(\mathcal{X}) = \frac{\mathcal{X}}{\mathcal{X}^2 + \mathcal{X}}$, $n_2(\mathcal{X}) = \frac{\mathcal{X}^4 - \mathcal{X}^3 + \mathcal{X}^2}{\mathcal{X}^5 + \mathcal{X}^2}$ **, prove that :** $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$\mathcal{X} - y = 7$, $\mathcal{X}y = 60$

5 **[a] Find n ($\mathcal{X}$) in the simplest form , showing the domain of n where :**

$$n(\mathcal{X}) = \frac{\mathcal{X}+1}{\mathcal{X}^2 + 3\mathcal{X} + 2} - \frac{\mathcal{X}+2}{\mathcal{X}^2 - 4}$$

[b] If A and B are mutually exclusive events of the sample space of a random experiment and $P(A) = \frac{1}{4}$, $P(A \cup B) = \frac{5}{12}$ **, find :** P (B)

25 North Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 One of the solutions of the inequality : $2\mathcal{X} - 3 > 3$ where $\mathcal{X} \in \mathbb{Z}$ is ....

(a) $\mathcal{X} = 3$ (b) $\mathcal{X} = -3$ (c) $\mathcal{X} = 7$ (d) $\mathcal{X} = -7$

2 If $\mathcal{X} - y = 3$, $\mathcal{X} + y = 9$, then y = ...

(a) 6 (b) – 6 (c) 3 (d) – 3

3 If $a = \sqrt{3}$, $b = \frac{1}{\sqrt{3}}$, then $a^{50} \times b^{51} =$ ....

(a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

4 If $n(\mathcal{X}) = \frac{\mathcal{X}}{\mathcal{X}+5}$, then the domain of n^{-1} = ...

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{0 , -5\}$

5 If $\mathcal{X}^2 - y^2 = 15$, $\mathcal{X} - y = 3$, then $\mathcal{X} + y$ = ...

(a) 5 (b) 13 (c) 18 (d) 45

6 If a regular die is tossed once , the probability of appearance of a number less than 3 equals ....

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

2 [a] If A , B are two events of a random experiment and

$P(A) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{5}$, $P(B) = \frac{2}{5}$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

[b] **Find the common domain of n_1 , n_2 :** if $n_1(x) = \frac{-1}{x^2 - 9}$, $n_2(x) = \frac{7}{x}$

3 [a] **By using the general rule , find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 2x = 4$, rounding the results to two decimal places.

[b] **Find n (x) in the simplest form , showing the domain :**

$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$

4 [a] **Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:**

$x - y = 0$, $xy = 16$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

5 [a] If $n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$

, **find :** n (x) in the simplest form , showing the domain of n

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :**

$x + y = 4$, $2x - y = 2$

26 Red Sea Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The solution set of the two equations : $x + 2 = 0$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(2 , 3)\}$ (b) $\{(3 , 2)\}$ (c) $\{(-2 , 3)\}$ (d) $\{(3 , -2)\}$

2 If $2^5 \times 3^5 = 6^m$, then m = ...

(a) 10 (b) 5 (c) 6 (d) 25

3 If $A \subset S$ of a random experiment, $P(\acute{A}) = 2P(A)$, then P (A) ....

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

4 If $(5\ , \mathcal{X}-4)=(y\ , 3)$, then $\mathcal{X}+y=$ ……………

(a) 25 (b) 12 (c) 8 (d) 6

5 The set of zeroes of f where $f(\mathcal{X})=$ zero is ……………

(a) $\varnothing$ (b) zero (c) $\mathbb{R}$ (d) $\mathbb{R}-\{0\}$

6 $(-1)^{15}+(-1)^{14}=$ ……………

(a) 1 (b) 2 (c) -2 (d) zero

2 [a] **Find the S.S of the following two equations in $\mathbb{R}\times\mathbb{R}$:**

$2\mathcal{X}-y=3$, $\mathcal{X}+2y=4$

[b] **Find n ($\mathcal{X}$) in the simplest form , showing the domain :** $n(\mathcal{X})=\frac{\mathcal{X}^2}{\mathcal{X}-1}+\frac{\mathcal{X}}{1-\mathcal{X}}$

3 [a] **By using the general rule, solve the equation :** $\mathcal{X}^2-\mathcal{X}=4$ in $\mathbb{R}$

, approximating the result to the nearest two decimals

[b] **Prove that $n_1=n_2$ if :** $n_1(\mathcal{X})=\frac{\mathcal{X}^3+1}{\mathcal{X}^3-\mathcal{X}^2+\mathcal{X}}$, $n_2(\mathcal{X})=\frac{\mathcal{X}^3+\mathcal{X}^2+\mathcal{X}+1}{\mathcal{X}^3+\mathcal{X}}$

4 [a] **Find the S.S. in $\mathbb{R}\times\mathbb{R}$ of the two equations :** $\mathcal{X}-y=1$, $\mathcal{X}^2+y^2=25$

[b] If $n(\mathcal{X})=\frac{\mathcal{X}^2-2\mathcal{X}}{\mathcal{X}^2-5\mathcal{X}+6}$

1 **Find :** $n^{-1}(\mathcal{X})$ and identify the domain of n^{-1}

2 If $n^{-1}(\mathcal{X})=2$, what is the value of $\mathcal{X}$?

5 [a] **Find n ($\mathcal{X}$) in the simplest form , showing the domain where :**

$n(\mathcal{X})=\frac{\mathcal{X}^3-8}{\mathcal{X}^2+\mathcal{X}-6}\times\frac{\mathcal{X}+3}{\mathcal{X}^2+2\mathcal{X}+4}$

[b] If A and B are two events from the sample space of a random experiment and

$P(A)=0.3$, $P(B)=0.6$, $P(A\cap B)=0.2$

, **find :** 1 $P(A\cup B)$ 2 $P(A-B)$

27 Matrouh Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The two straight lines : $\mathcal{X}+2y=1$, $2\mathcal{X}+4y=6$ are ……………

(a) parallel. (b) intersecting.

(c) perpendicular. (d) intersecting and perpendicular.

2 The solution set of the equation : $x^2 = 2x$ in $\mathbb{Z}$ is ....

(a) $\{2\}$ (b) $(0, 2)$ (c) $\{0, 2\}$ (d) $\{(0, 2)\}$

3 The intersection point of the two straight lines : $x = 1$ and $y - 2 = 0$ lies on the .... quadrant.

(a) first. (b) second. (c) third. (d) fourth.

4 If $A \subset B$, then $P(A \cup B) =$ ....

(a) $P(A)$ (b) $P(B)$ (c) $P(A \cap B)$ (d) zero

5 If x is a negative number, then the largest number from the following is ....

(a) $5 + x$ (b) $5x$ (c) $5 - x$ (d) $\frac{5}{x}$

6 The set of zeroes of the function f where $f(x) = 4$ is ....

(a) zero (b) $\{4\}$ (c) $\{0, 4\}$ (d) $\varnothing$

2 **[a] By using the general formula, find in $\mathbb{R}$ the solution set of the equation :**

$x + \frac{1}{x} + 3 = 0$ where $x \neq 0$, rounding the results to two decimal places.

[b] If $n(x) = \frac{x^2 - 1}{x^2 - x}$, then reduce $n(x)$ to the simplest form, showing the domain of n

3 **[a] Simplify :** $n(x) = \frac{x - 1}{x^2 - 1} \div \frac{x^2 - 5x}{x^2 - 4x - 5}$, showing the domain.

[b] If the sum of two positive numbers is 9, and the difference between their squares is 27, find the two numbers.

4 **[a]** If A, B are two events from the sample space of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **then prove that :** $n_1 = n_2$

5 **[a] Find n (x) in the simplest form, showing the domain where :**

$n(x) = \frac{3x}{x^2 - x - 2} + \frac{x - 1}{1 - x^2}$

[b] Find the solution set of the following two equations graphically in $\mathbb{R} \times \mathbb{R}$:

$y = x + 4$, $x + y = 4$

Answers of school book examinations in algebra and probability

Model 1

1

1 b 2 a 3 d 4 c 5 b 6 a

2

[a] $\because 2x^2 - 5x + 1 = 0$

$\therefore a = 2 \;,\; b = -5 \;,\; c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore x \approx 2.3$ or $x \approx 0.2$

$\therefore$ The S.S. $= \{2.3 \;, 0.2\}$

[b] $\because n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 \;, 4 \;, 0\}$

$, n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

3

[a] $\because x - y = 0 \qquad \therefore x = y$ (1)

$, x^2 + xy + y^2 = 27$ (2)

Substituting from (1) in (2) :

$\therefore y^2 + y^2 + y^2 = 27 \qquad \therefore 3y^2 = 27$

$\therefore y^2 = 9 \qquad \therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3 \;, 3) \;, (-3 \;, -3)\}$

[b] $\because n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 \;, -3\}$

$, n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3}$

$= \frac{x+1}{x-3}$

$, n(2) = \frac{2+1}{2-3} = \frac{3}{-1} = -3$

$, n(-3)$ undefined because $-3 \notin$ the domain of n

4

[a] Let the length be x cm. and the width be y cm.

$\therefore x = y + 4$ (1)

$, \because 28 = 2(x + y) \quad \therefore x + y = 14$ (2)

Substituting from (1) in (2) :

$\therefore y + 4 + y = 14 \quad \therefore 2y = 10 \quad \therefore y = 5$

Substituting in (1) : $\therefore x = 9$

$\therefore$ The length = 9 cm. , the width = 5 cm.

$\therefore$ The area $= 9 \times 5 = 45$ cm^2.

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 \;, 1 \;, 2\}$

$, n^{-1}(x) = \frac{x-1}{x}$

2 $\because n^{-1}(x) = 3 \qquad \therefore \frac{x-1}{x} = 3$

$\therefore 3x = x - 1 \qquad \therefore 3x - x = -1$

$\therefore 2x = -1 \qquad \therefore x = \frac{-1}{2}$

5

[a] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 \;, 1\}$
$, \because n_1(x) = \frac{1}{x-1}$ } (1)

$\because n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 \;, 1\}$
$, n_2(x) = \frac{1}{x-1}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(A \cap B) = \frac{2}{6} = \frac{1}{3}$

2 $P(A - B) = \frac{1}{6}$

3 The probability of non-occurrence of the event A $= \frac{3}{6} = \frac{1}{2}$

Model 2

1

1 a   2 d   3 a   4 b   5 c   6 a

2

[a] $\because 3x^2 - 5x + 1 = 0$

$\therefore a = 3 \quad , \quad b = -5 \quad , \quad c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{25 - 12}}{6}$

$= \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43 \quad \text{or} \quad x \approx 0.23$

$\therefore$ The S.S. $= \{1.43 , 0.23\}$

[b] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

$, n(x) = 1$

3

[a] $\because x - y = 1 \qquad \therefore x = y + 1 \qquad (1)$

$, x^2 + y^2 = 25 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0 \qquad \therefore y^2 + y - 12 = 0$

$\therefore (y-3)(y+4) = 0$

$\therefore y = 3 \quad \text{or} \quad y = -4$

Substituting in (1) : $\therefore x = 4 \quad \text{or} \quad x = -3$

$\therefore$ The S.S. $= \{(4 , 3) , (-3 , -4)\}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

4

[a] $\because 2x - y = 3 \qquad \therefore y = 2x - 3 \qquad (1)$

$, x + 2y = 4 \qquad (2)$

Substituting from (1) in (2) :

$\therefore x + 2(2x - 3) = 4$

$\therefore x + 4x - 6 = 4 \qquad \therefore 5x = 10 \qquad \therefore x = 2$

Substituting in (1) : $\therefore y = 1$

[b] $\because n(x) = \frac{x(x+3)}{(x+3)(x-3)} \div \frac{2x}{x+3}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3 , 3 , 0\}$

$, n(x) = \frac{x}{x-3} \times \frac{x+3}{2x} = \frac{x+3}{2(x-3)}$

5

[a] $\because n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x+3}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -2 , 3\}$

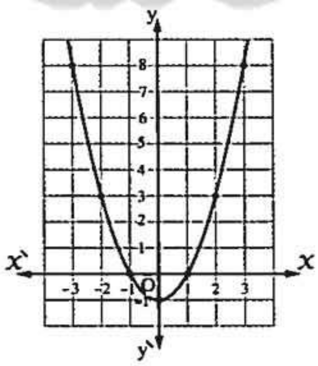
$, n(x) = \frac{x}{(x-2)} + \frac{x+3}{(x-2)(x-3)}$

$= \frac{x(x-3) + x + 3}{(x-2)(x-3)} = \frac{x^2 - 3x + x + 3}{(x-2)(x-3)}$

$= \frac{x^2 - 2x + 3}{(x-2)(x-3)}$

[b] $f(x) = x^2 - 1$

x	−3	−2	−1	0	1	2	3
y	8	3	0	−1	0	3	8



From the graph :

$\therefore$ The S.S. $= \{-1 , 1\}$

Model examination for the merge students

1

1 0 | 2 $\frac{1}{x-2}$ | 3 $\frac{2}{3}$

4 second | 5 second | 6 $\{5\}$

2

1 a | 2 b | 3 c

4 b | 5 c | 6 a

3

1 ✗ | 2 ✗ | 3 ✓

4 ✓ | 5 ✗ | 6 ✓

4

1 $\{(2, 1)\}$ | 2 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

3 $\mathbb{R} - \{1, -1\}$ | 4 $\frac{x}{x^2 + 4}$

5 $\{5\}$ | 6 $\frac{1}{3}$

Answers of governorates' examinations of algebra & probability

1 Cairo

1

1 d　2 c　3 d　4 b　5 d　6 c

2

[a] Let x and y be two real numbers

$\therefore x + y = 40$ (1)

$, x \quad y = 10$ (2)

Adding (1) and (2) : $\therefore 2x = 50$　$\therefore x = 25$

Substituting in (1) : $\therefore y = 15$

$\therefore$ The two real numbers are 25 , 15

[b] $\because n(x) = \frac{x}{x-2} - \frac{2(x+2)}{(x+2)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$

$, n(x) = \frac{x}{x-2} - \frac{x}{x-2} = \frac{x-2}{x-2} = 1$

3

[a] $\because x - 3 = 0$　$\therefore x = 3$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore 9 + y^2 = 25$

$\therefore y^2 = 16$　$\therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(3, 4), (3, -4)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$, n_1(x) = \frac{1}{x-1}$, $\because n_2(x) = \frac{x^2+x+1}{(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{1\}$

$, n_2(x) = \frac{1}{x-1}$

$\therefore n_1(x) = n_2(x)$ for all the values of $x \in \mathbb{R} - \{0, 1\}$

4

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x+3)(x-2)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$, $n(x) = 1$

[b] $\because 2x^2 + 5x - 6 = 0$　$\therefore a = 2, b = 5, c = -6$

$\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times (-6)}}{2 \times 2} = \frac{-5 \pm \sqrt{73}}{4}$

$\therefore x \approx 0.9$ or $x \approx -3.4$

$\therefore$ The S.S. $= \{0.9, -3.4\}$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(P \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

2 $P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$

[b] 1 $\because n(x) = \frac{x}{x+3}$　$\therefore n^{-1}(x) = \frac{x+3}{x}$

, the domain of $n^{-1} = \mathbb{R} - \{0, -3\}$

2 $\because n^{-1}(x) = 4$　$\therefore \frac{x+3}{x} = 4$

$\therefore 4x = x + 3$　$\therefore 3x = 3$　$\therefore x = 1$

2 Giza

1

1 c　2 d　3 b　4 a　5 c　6 b

2

[a] $\because 2x^2 - 5x + 1 = 0$　$\therefore a = 2, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore x \approx 2.28$ or $x \approx 0.22$

$\therefore$ The S.S. $= \{2.28, 0.22\}$

[b] $\because n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2+2x+4)} \div \frac{(x+2)(x-3)}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

$, n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{(x+2)(x-3)}$

$= \frac{1}{x-3}$

3

[a] Let the lengths of the two sides of the right angle be x cm. and y cm.

$\therefore x + y + 10 = 24$　$\therefore x + y = 14$

$\therefore x = 14 - y$ (1)

$, x^2 + y^2 = 100$ (2)

Substituting from (1) in (2) : $\therefore (14 - y)^2 + y^2 = 100$

$\therefore 196 - 28y + y^2 + y^2 - 100 = 0$

$\therefore 2y^2 - 28y + 96 = 0$ (Dividing by 2)

$\therefore y^2 - 14y + 48 = 0$　$\therefore (y - 6)(y - 8) = 0$

$\therefore y = 6$ or $y = 8$

Substituting in (1) : $\therefore x = 8$ or $x = 6$

$\therefore$ The side lengths of the right angle are 6 cm. and 8 cm.

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cup B) = P(A) + P(B) = 0.2 + 0.5 = 0.7$

$, P(A - B) = P(A) = 0.2$

4

[a] 1 $\therefore n(x) = \frac{x(x-3)}{(x-2)(x-3)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-3)}$

, the domain of $n^{-1} = \mathbb{R} - \{0, 3, 2\}$

$\therefore n^{-1}(x) = \frac{x-2}{x}$

2 $\because n^{-1}(x) = 2 \qquad \therefore \frac{x-2}{x} = 2$

$\therefore x - 2 = 2x \qquad \therefore x = -2$

[b] $\because x + 2y = 4$ (1)

$, 3x - y = 5$ (multiplying by 2)

$\therefore 6x - 2y = 10$ (2)

Adding (1) and (2) : $\therefore 7x = 14 \qquad \therefore x = 2$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(2, 1)\}$

5

[a] $\because n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = \frac{x(x-1)}{x-1}$

$\therefore n(x) = x$

[b] $\because n_1(x) = \frac{(x+3)(x-2)}{(x+2)(x-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2, 2\}$, $n_1(x) = \frac{x+3}{x+2}$ (1)

$, \because n_2(x) = \frac{(x+3)(x-3)}{(x-3)(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3, -2\}$, $n_2(x) = \frac{x+3}{x+2}$ (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

Because the domain of $n_1 \neq$ the domain of n_2

3 Alexandria

1

1 b 2 d 3 b 4 d 5 a 6 a

2

[a] $\because x - y = 0 \qquad \therefore x = y$ (1)

$, x^2 + xy + y^2 = 27$ (2)

Substituting from (1) in (2) : $\therefore y^2 + y^2 + y^2 = 27$

$\therefore 3y^2 = 27 \qquad \therefore y^2 = 9$

$\therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n_1(x) = \frac{(x-3)(x+4)}{(x+1)(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-1, -4\}$

$, n_1(x) = \frac{x-3}{x+1}$

$, \because n_2(x) = \frac{(x-3)(x+1)}{(x+1)(x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-1\}$, $n_2(x) = \frac{x-3}{x+1}$

$\therefore n_1(x) = n_2(x)$ for all values of $x \in \mathbb{R} - \{-1, -4\}$

3

[a] $\because 2x^2 + 5x = 0 \qquad \therefore a = 2, b = 5, c = 0$

$\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times 0}}{2 \times 2} = \frac{-5 \pm 5}{4}$

$\therefore x = 0$ or $x = -2.5$

$\therefore$ The S.S. $= \{0, -2.5\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$, $n(x) = \frac{x+3}{x}$

4

[a] $\because 2x + y = 1 \qquad \therefore y = 1 - 2x$ (1)

$, x + 2y = 5$ (2)

Substituting from (1) in (2) :

$\therefore x + 2(1 - 2x) = 5 \qquad \therefore x + 2 - 4x = 5$

$\therefore -3x = 3 \qquad \therefore x = -1$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(-1, 3)\}$

[b] $\because n(x) = \frac{x(x-1)}{(x-1)(x+1)} + \frac{x+5}{(x+1)(x+5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, -1, -5\}$

$, n(x) = \frac{x}{x+1} + \frac{1}{x+1} = \frac{x+1}{x+1} = 1$

5

[a] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x)=3 \quad \therefore \frac{x^2+2}{x}=3$

$\therefore x^2+2=3x \quad \therefore x^2-3x+2=0$

$\therefore (x-2)(x-1)=0$

$\therefore x=2$ (refused) or $x=1$

[b] A and B are mutually exclusive events

$\therefore P(A\cup B)=P(A)+P(B)$

$\therefore P(B)=P(A\cup B)-P(A)=\frac{7}{12}-\frac{1}{3}=\frac{1}{4}$

4 El-Kalyoubia

1

1 b   2 d   3 c   4 a   5 c   6 c

2

[a] 1 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.8+0.7-0.6=0.9$

2 $P(\acute{A})=1-P(A)=1-0.8=0.2$

[b] Let the length be x cm. and the width be y cm.

$\therefore x-y=4$ (1)

, $2(x+y)=28$ (Dividing by 2)

$\therefore x+y=14$ (2)

Adding (1) and (2) : $\therefore 2x=18 \quad \therefore x=9$

Substituting in (1) : $\therefore y=5$

$\therefore$ The length = 9 cm. , the width = 5 cm.

$\therefore$ The area of the rectangle $=9\times 5=45\ cm^2$

3

[a] $\because x-y=0 \quad \therefore x=y$ (1)

, $x^2+xy+y^2=27$ (2)

Substituting from (1) in (2) : $\therefore y^2+y^2+y^2=27$

$\therefore 3y^2=27 \quad \therefore y^2=9$

$\therefore y=3$ or $y=-3$

Substituting in (1) : $\therefore x=3$ or $x=-3$

$\therefore$ The S.S. $=\{(3,3),(-3,-3)\}$

[b] $\because n(x)=\frac{x(x+2)}{(x-3)(x^2+3x+9)}\div\frac{x+2}{x^2+3x+9}$

$\therefore$ The domain of $n=\mathbb{R}-\{3,-2\}$

, $n(x)=\frac{x(x+2)}{(x-3)(x^2+3x+9)}\times\frac{x^2+3x+9}{x+2}$

$=\frac{x}{x-3}$

4

[a] $\because 2x^2-4x+1=0$

$\therefore a=2, b=-4, c=1$

$\therefore x=\frac{4\pm\sqrt{(-4)^2-4\times 2\times 1}}{2\times 2}=\frac{4\pm 2\sqrt{2}}{4}=\frac{2\pm\sqrt{2}}{2}$

$\therefore x\approx 1.7$ or $x\approx 0.3 \quad \therefore$ The S.S. $=\{1.7, 0.3\}$

[b] $\because n_1(x)=\frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-2\}$, $n_1(x)=\frac{x}{x+2}$ (1)

, $\because n_2(x)=\frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-2\}$, $n_2(x)=\frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

5

[a] $\because n(x)=\frac{x^2+2x+4}{(x-2)(x^2+2x+4)}+\frac{(x-3)(x+3)}{(x+3)(x-2)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2,-3\}$

, $n(x)=\frac{1}{x-2}+\frac{x-3}{x-2}=\frac{x-2}{x-2}=1$

[b] $\because$ The domain of $f=\mathbb{R}-\{2,k\}$

$\therefore$ where $x=2 \quad \therefore x^2-5x+m=0$

$\therefore 4-5\times 2+m=0 \quad \therefore m=6$

$\therefore f(x)=\frac{x}{x^2-5x+6}$

$\therefore f(x)=\frac{x}{(x-2)(x-3)}$

$\therefore$ The domain of $f=\mathbb{R}-\{2,3\} \quad \therefore k=3$

5 El-Sharkia

1

1 d   2 b   3 d   4 a   5 d   6 d

2

[a] $\because x(x-2)=1 \quad \therefore x^2-2x-1=0$

$\therefore a=1, b=-2, c=-1$

$\therefore x=\frac{2\pm\sqrt{(-2)^2-4\times 1\times(-1)}}{2\times 1}$

$=\frac{2\pm\sqrt{8}}{2}=\frac{2\pm 2\sqrt{2}}{2}=1\pm\sqrt{2}$

$\therefore x=1+\sqrt{2}$ or $x=1-\sqrt{2}$

$\therefore$ The S.S. $=\{1+\sqrt{2}, 1-\sqrt{2}\}$

[b] $\because$ $n(x) = \frac{x(x^2+1)}{x^2+1} + \frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2\}$

, $n(x) = x + \frac{1}{x-2} = \frac{x(x-2)+1}{x-2}$

$= \frac{x^2-2x+1}{x-2} = \frac{(x-1)(x-1)}{x-2}$

3

[a] $\because$ $2x - y = 3$ (1)

, $x + 2y = 4$ $\therefore$ $x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore$ $2(4-2y) - y = 3$

$\therefore$ $8 - 4y - y = 3$ $\therefore$ $8 - 5y = 3$

$\therefore$ $-5y = -5$ $\therefore$ $y = 1$

Substituting in (2) : $\therefore$ $x = 2$

$\therefore$ The S.S. = $\{(2, 1)\}$

[b] $\because$ $n(x) = \frac{(x-5)(x+3)}{(x-3)(x+3)} \div \frac{-2(x-5)}{(x-3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 5\}$

, $n(x) = \frac{x-5}{x-3} \times \frac{(x-3)(x-3)}{-2(x-5)} = \frac{x-3}{-2}$

4

[a] $\because$ $x + 2y = 2$ $\therefore$ $2y = 2 - x$ (1)

, $x^2 + 2xy = 2$ (2)

Substituting from (1) in (2) :

$\therefore$ $x^2 + x(2-x) = 2$ $\therefore$ $x^2 + 2x - x^2 = 2$

$\therefore$ $2x = 2$ $\therefore$ $x = 1$

Substituting in (1) : $\therefore$ $y = \frac{1}{2}$

$\therefore$ The S.S. = $\{(1, \frac{1}{2})\}$

[b] $\because$ $n_1(x) = 1 - \frac{1}{x}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$ (1)
, $n_1(x) = \frac{x-1}{x}$

, $\because$ $n_2(x) = \frac{1-x}{x}$ (2)
$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

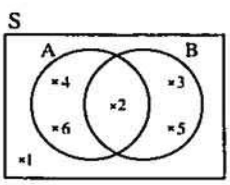
From (1) and (2) : $\therefore$ $n_1 \neq n_2$

5

[a] $P(A) = \frac{3}{6} = \frac{1}{2}$

$P(B) = \frac{3}{6} = \frac{1}{2}$

$P(A \cup B) = \frac{5}{6}$



[b] $\because$ The domain of $n = \mathbb{R} - \{0, 4\}$

$\therefore$ $4 + m = 0$ $\therefore$ $m = -4$

, $\because$ $n(5) = 2$ $\therefore$ $\frac{k}{5} + \frac{9}{5-4} = 2$ $\therefore$ $\frac{k}{5} + 9 = 2$

$\therefore$ $\frac{k}{5} = -7$ $\therefore$ $k = -35$

6 El-Monofia

1

1 d 2 b 3 c 4 d 5 c 6 a

2

[a] $\because$ $2x - y = 3$ (1)

, $x + 2y = 4$ $\therefore$ $x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore$ $2(4-2y) - y = 3$

$\therefore$ $8 - 4y - y = 3$ $\therefore$ $8 - 5y = 3$

$\therefore$ $-5y = -5$ $\therefore$ $y = 1$

Substituting in (2) : $\therefore$ $x = 2$

$\therefore$ The S.S. = $\{(2, 1)\}$

[b] $\because$ $3x^2 = 5x - 1$ $\therefore$ $3x^2 - 5x + 1 = 0$

$\therefore$ $a = 3$, $b = -5$, $c = 1$

$\therefore$ $x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore$ $x \approx 1.43$ or $x \approx 0.23$

$\therefore$ The S.S. = $\{1.43, 0.23\}$

3

[a] $\because$ $z(f) = \{3\}$ $\therefore$ At $x = 3$

$\therefore$ $x^2 - ax + 9 = 0$ $\therefore$ $3^2 - a \times 3 + 9 = 0$

$\therefore$ $9 - 3a + 9 = 0$ $\therefore$ $-3a = -18$ $\therefore$ $a = 6$

, $\because$ The domain of $f = \mathbb{R} - \{2\}$

$\therefore$ At $x = 2$ $\therefore$ $bx + 4 = 0$

$\therefore$ $2b + 4 = 0$ $\therefore$ $2b = -4$ $\therefore$ $b = -2$

[b] $\because$ $n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)} \div \frac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, 1, 0, -\frac{3}{2}\}$

, $n(x) = \frac{x^2+2x+4}{x-1} \times \frac{(2x+3)(x-1)}{x(x^2+2x+4)} = \frac{2x+3}{x}$

4

[a] $\because$ $n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4, 0\}$

, $n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

, n (4) in undefined because $4 \notin$ the domain of n

[b] $\because x + y = 4 \quad \therefore y = 4 - x \quad (1)$

$, \frac{1}{x} + \frac{1}{y} = 1 \quad \therefore y + x = x y \quad (2)$

Substituting from (1) in (2) :

$\therefore 4 - x + x = x(4 - x) \quad \therefore 4 = 4x - x^2$

$\therefore x^2 - 4x + 4 = 0 \quad \therefore (x - 2)(x - 2) = 0$

$\therefore x = 2$

Substituting in (1) : $\therefore y = 2$

$\therefore$ The S.S. = $\{(2, 2)\}$

5

[a] $\because n_1 = \frac{(x+3)(x+2)}{(x+2)(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2, 1\}$
$, n_1(x) = \frac{x+3}{x-1}$ } (1)

$, \because n_2(x) = \frac{(x-5)(x+3)}{(x-5)(x-1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{5, 1\}$
$, n_2(x) = \frac{x+3}{x-1}$ } (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_2 \neq$ the domain of n_2

[b] 1 $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$= \frac{1}{4} + \frac{1}{2} - \frac{5}{8} = \frac{1}{8}$

2 $P(B - A) = P(B) - P(A \cap B) = \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$

3 $P(A \cup B)' = 1 - P(A \cup B) = 1 - \frac{5}{8} = \frac{3}{8}$

7 El-Gharbia

1

1 c 2 d 3 b 4 d 5 c 6 d

2

[a] $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore 0.8 = 0.5 + x - 0.1 \quad \therefore x = 0.4$

$, \because P(A - B) = P(A) - P(A \cap B) = 0.5 - 0.1 = 0.4$

[b] $\because n(x) = \frac{x(x-2)+x}{x-2} = \frac{x^2 - 2x + x}{x-2}$

$= \frac{x^2 - x}{x-2} = \frac{x(x-1)}{x-2}$

$\therefore n^{-1}(x) = \frac{x-2}{x(x-1)}$

, the domain of $n^{-1} = \mathbb{R} - \{0, 1, 2\}$

3

[a] $\because n(x) = \frac{x}{x-2} - \frac{x}{x+2}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$

$, n(x) = \frac{x(x+2) - x(x-2)}{(x-2)(x+2)}$

$= \frac{x^2 + 2x - x^2 + 2x}{(x-2)(x+2)} = \frac{4x}{(x-2)(x+2)}$

[b] $\because x - y = 3 \quad \therefore x = y + 3 \quad (1)$

$, y^2 - x y = 21 \quad (2)$

Substituting from (1) in (2) : $\therefore y^2 - (y+3) y = 21$

$\therefore y^2 - y^2 + 3y = 21$

$\therefore 3y = 21 \quad \therefore y = 7$

Substituting in (1) : $\therefore x = 10$

$\therefore$ The S.S. = $\{(10, 7)\}$

4

[a] $\because x^2 + 2x - 4 = 0$

$\therefore a = 1, b = 2, c = -4$

$\therefore x = \frac{-2 \pm \sqrt{(2)^2 - 4 \times 1 \times (-4)}}{2 \times 1}$

$= \frac{-2 \pm \sqrt{20}}{2} = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}$

$\therefore x = -1 + \sqrt{5}$ or $x = -1 - \sqrt{5}$

The S.S. = $\{-1 + \sqrt{5}, -1 - \sqrt{5}\}$

[b] $\because n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-3, 2\}$
$, n_1(x) = \frac{x+2}{x+3}$ } (1)

$, \because n_2(x) = \frac{(x-3)(x+2)}{(x+3)(x-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-3, 3\}$
$, n_2(x) = \frac{x+2}{x+3}$ } (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

5

[a] $\because n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \div \frac{x^2+x+1}{x+3}$

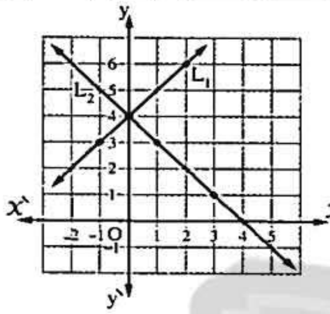
$\therefore$ The domain of $n = \mathbb{R} - \{0, 1, -3\}$

$, n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1} = \frac{x+3}{x}$

[b] $y = x + 4$, $x = 4 - y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : ∴ The S.S. = $\{(0, 4)\}$

8 El-Dakahlia

1

[a] 1 b 2 a 3 a

[b] ∵ $3x - y = 5$ (1)

, $x + 2y = 4$ ∴ $x = 4 - 2y$ (2)

Substituting from (2) in (1) : ∴ $3(4 - 2y) - y = 5$

∴ $12 - 6y - y = 5$ ∴ $-7y = -7$

∴ $y = 1$

Substituting in (2) : ∴ $x = 2$

∴ The S.S. = $\{(2, 1)\}$

2

[a] 1 a 2 d 3 d

[b] ∵ $n(x) = \frac{x(x+1)}{(x-1)(x+1)} + \frac{x-5}{(x-1)(x-5)}$

∴ The domain of n = $\mathbb{R} - \{1, -1, 5\}$

, $n(x) = \frac{x}{(x-1)} + \frac{1}{(x-1)} = \frac{x+1}{x-1}$

3

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.5 - 0.3 = 0.8$

∵ $P(\bar{B}) = 1 - P(B)$ ∴ $P(\bar{B}) = 1 - 0.5 = 0.5$

[b] ∵ $n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

∴ The domain of n = $\mathbb{R} - \{1\}$, $n(x) = 2$

4

[a] ∵ $n_1(x) = \frac{x(x-1)}{x^2(x-2)}$

∴ The domain of $n_1 = \mathbb{R} - \{0, 2\}$

, $n_1(x) = \frac{x-1}{x(x-2)}$ } (1)

, ∵ $n_2(x) = \frac{(x-2)(x-1)}{x(x-2)(x-2)}$

∴ The domain of $n_2 = \mathbb{R} - \{0, 2\}$

, $n_2(x) = \frac{x-1}{x(x-2)}$ } (2)

From (1) and (2) : ∴ $n_1 = n_2$

[b] ∵ $2x^2 - 4x + 1 = 0$

∴ $a = 2, b = -4, c = 1$

∴ $x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2}$

$= \frac{4 \pm \sqrt{8}}{4} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$

∴ $x \approx 1.71$ or $x \approx 0.29$

The S.S. = $\{1.71, 0.29\}$

5

[a] ∵ $x - y = 0$ ∴ $x = y$ (1)

, $x = \frac{4}{y}$ (2)

Substituting from (1) in (2) : ∴ $x = \frac{4}{x}$

∴ $x^2 = 4$ ∴ $x = \pm\sqrt{4}$

∴ $x = 2$ or $x = -2$

Substituting in (1) : ∴ $y = 2$ or $y = -2$

∴ The S.S. = $\{(2, 2), (-2, -2)\}$

[b] 1 ∵ $n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

∴ $n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

, the domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

, $n^{-1}(x) = \frac{x^2+2}{x}$

2 ∵ $n^{-1}(x) = 3$ ∴ $\frac{x^2+2}{x} = 3$

∴ $x^2 + 2 = 3x$ ∴ $x^2 - 3x + 2 = 0$

∴ $(x-2)(x-1) = 0$

∴ $x = 2$ (refused) or $x = 1$

9 Ismailia

1

1 c 2 b 3 d 4 a 5 c 6 c

2

[a] $\because 2x + y = 1 \quad \therefore y = 1 - 2x$ (1)

$, x + 2y = 5$ (2)

Substituting from (1) in (2) :

$\therefore x + 2(1 - 2x) = 5$

$\therefore x + 2 - 4x = 5 \qquad \therefore -3x = 3$

$\therefore x = -1$

Substituting in (1) : y = 3

$\therefore$ The S.S. $= \{(-1, 3)\}$

[b] $\because n_1(x) = \frac{x^2 - 3x + 9}{(x+3)(x^2 - 3x + 9)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-3\}$, $n_1(x) = \frac{1}{x+3}$ (1)

$, \because n_2(x) = \frac{2}{2(x+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-3\}$, $n_2(x) = \frac{1}{x+3}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because 3x^2 - 6x + 1 = 0$

$\therefore a = 3, b = -6, c = 1$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$

$= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$

$\therefore x \approx 1.82$ or $x \approx 0.18$

The S.S. $= \{1.82, 0.18\}$

[b] $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore$ At $x = 3 \qquad \therefore x^2 - ax + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \qquad \therefore -3a = -18 \qquad \therefore a = 6$

4

[a] Let the two numbers be x and y

$\therefore xy = 10$ (1)

$, x - y = 3 \qquad \therefore x = y + 3$ (2)

Substituting from (2) in (1) : $\therefore (y + 3)y = 10$

$\therefore y^2 + 3y - 10 = 0 \qquad \therefore (y - 2)(y + 5) = 0$

$\therefore y = 2$ or $y = -5$

Substituting in (2) : $x = 5$ or $x = -2$

$\therefore$ The two numbers are : 5 , 2 or − 2 , − 5

[b] $\because n(x) = \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \div \frac{x+5}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -5\}$

$, n(x) = \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{x+5}$

$= \frac{x-1}{x-2}$

$, \because n(3) = \frac{3-1}{3-2} = 2$

, n (2) is undefined because $2 \notin$ the domain of n

5

[a] $\because n(x) = \frac{x(x-3)}{(x-3)(x+3)} + \frac{x-1}{(x+3)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 1\}$

$, n(x) = \frac{x}{x+3} + \frac{1}{x+3} = \frac{x+1}{x+3}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.4 + 0.5 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.4 - 0.2 = 0.2$

10 Suez

1

1 c 2 b 3 a 4 c 5 b 6 c

2

[a] $\because x - y = 3 \qquad \therefore x = y + 3$ (1)

$, 2x + y = 9$ (2)

Substituting from (1) in (2) : $\therefore 2(y + 3) + y = 9$

$\therefore 2y + 6 + y = 9 \qquad \therefore 3y = 3 \qquad \therefore y = 1$

Substituting in (1) : $\therefore x = 4$

$\therefore$ The S.S. $= \{(4, 1)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, -3\}$

$, n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$

3

[a] $x - y = 0$ $\therefore x = y$ (1)

, $xy = 9$ (2)

Substituting from (1) in (2) : $\therefore x^2 = 9$

$\therefore x = \pm\sqrt{9}$

$\therefore x = 3$ or $x = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n(x) = \frac{(x+3)(x-1)}{x+3} \times \frac{x+1}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3, 1, -1\}$

, $n(x) = 1$

4

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\because n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

, $n(x) = \frac{x-1}{x^2+x+1} \times \frac{x^2+x+1}{x-1} = 1$

5

[a] $\because x^2 - 2x - 6 = 0$

$\therefore a = 1, b = -2, c = -6$

$\therefore x = \frac{2 \pm\sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$

$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore x \approx 3.65$ or $x \approx -1.65$

$\therefore$ The S.S. $= \{3.65, -1.65\}$

[b] $\because n_1(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(x) = \frac{x}{x+2}$ (1)

, $\because n_2(x) = \frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$, $n_2(x) = \frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

11 Port Said

1

1 b 2 c 3 b 4 d 5 d 6 a

2

[a] $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore (3)^2 - 3a + 9 = 0$ $\therefore 18 - 3a = 0$

$\therefore -3a = -18$ $\therefore a = 6$

[b] Let the length be x cm. and the width be y cm.

$\therefore 2(x + y) = 22$ $\therefore y = 11 - x$ (1)

, $xy = 24$ (2)

Substituting from (1) in (2) : $\therefore x(11 - x) = 24$

$\therefore 11x - x^2 - 24 = 0$ (Multiplying by -1)

$\therefore x^2 - 11x + 24 = 0$

$(x-3)(x-8) = 0$ $\therefore x = 3$ or $x = 8$

Substituting in (1) : $\therefore y = 8$ or $y = 3$

$\therefore$ The length = 8 cm. , the width = 3 cm.

3

[a] $\because x^2 - 2x - 1 = 0$

$\therefore a = 1, b = -2, c = -1$

$\therefore x = \frac{2 \pm\sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2}$

$= 1 \pm \sqrt{2}$

$\therefore x \approx 2.4$ or $x \approx -0.4$

$\therefore$ The S.S. $= \{2.4, -0.4\}$

[b] $\because n(x) = \frac{x^2+x+1}{x} \div \frac{(x-1)(x^2+x+1)}{x(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$

, $n(x) = \frac{x^2+x+1}{x} \times \frac{x}{x^2+x+1} = 1$

4

[a] $\because x + 3y = 7$ $\therefore x = 7 - 3y$ (1)

, $5x - y = 3$ (2)

Substituting from (1) in (2) : $\therefore 5(7 - 3y) - y = 3$

$\therefore 35 - 15y - y = 3$ $\therefore -16y = -32$ $\therefore y = 2$

Substituting in (1) : $\therefore x = 1$

$\therefore$ The S.S. $= \{(1, 2)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x-3}{(x-3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

, $n(x) = \frac{x}{x-2} + \frac{1}{x-2} = \frac{x+1}{x-2}$

5

[a] 1 The probability that the number on the card is a multiple of 5 = $\frac{5}{20} = \frac{1}{4}$

2 The probability that the number on the card is a multiple of 5 = $\frac{4}{20} = \frac{1}{5}$

3 The probability that the number on the card is a multiple of 4 or 5 = $\frac{8}{20} = \frac{2}{5}$

[b] $\because n_1(x) = \frac{x+3}{(x-3)(x+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{3, -3\}$

, $n_1(x) = \frac{1}{x-3}$

, $\because n_2(x) = \frac{2}{2(x-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3\}$

, $n_2(x) = \frac{1}{x-3}$

$\therefore n_1(x) = n_2(x)$

for all the values of $x \in \mathbb{R} - \{3, -3\}$

12 Damietta

1

1 a   2 b   3 d   4 a   5 b   6 a

2

[a] $\because x + \frac{4}{x} = 6$

$\therefore x^2 + 4 = 6x \quad \therefore x^2 - 6x + 4 = 0$

$\therefore a = 1, b = -6, c = 4$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$

$\therefore x \approx 5.2$ or $x \approx 0.8$

$\therefore$ The S.S. = $\{5.2, 0.8\}$

[b] $\because n(x) = \frac{2x}{x-3} \div \frac{x(x+2)}{(x+3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 0, -2\}$

, $n(x) = \frac{2x}{x-3} \times \frac{(x+3)(x-3)}{x(x-2)} = \frac{2(x+3)}{x+2}$

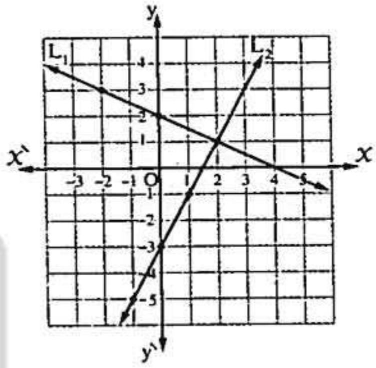
3

[a] $x = 4 - 2y$

x	−2	0	2
y	3	2	1

$y = 2x - 3$

x	1	0	−1
y	−1	−3	−5



From the graph : $\therefore$ The S.S. = $\{(2, 1)\}$

[b] $\because n(x) = \frac{x^2 - 2x + 4}{(x+2)(x^2 - 2x + 4)} + \frac{(x-1)(x+1)}{(x+2)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 1\}$

, $n(x) = \frac{1}{x+2} + \frac{x+1}{x+2} = \frac{x+2}{x+2} = 1$

4

[a] $\because n_1(x) = \frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$
, $n_1(x) = \frac{x}{x+2}$ (1)

, $\because n_2(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$
, $n_2(x) = \frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - y = 2 \quad \therefore x = y + 2$ (1)

, $x^2 + y^2 = 20$ (2)

Substituting from (1) in (2) : $\therefore (y+2)^2 + y^2 = 20$

$\therefore y^2 + 4y + 4 + y^2 = 20$

$\therefore 2y^2 + 4y - 16 = 0$ (Dividing by 2)

$\therefore y^2 + 2y - 8 = 0 \quad \therefore (y+4)(y-2) = 0$

$\therefore y = -4$ or $y = 2$

Substituting in (1) : $\therefore x = -2$ or $x = 4$

$\therefore$ The S.S. = $\{(-2, -4), (4, 2)\}$

5

[a] $\because$ The domain of n = $\mathbb{R} - \{5\}$

$\therefore (5)^2 - 5a + 25 = 0$

$\therefore -5a = -50 \quad \therefore a = 10$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

13 Kafr El-Sheikh

1

[a] 1 c 2 a 3 d

[b] $\because n(X) = \frac{(2X+3)(X-2)}{X(X-3)} \div \frac{(2X-3)(2X+3)}{X(2X-3)}$

$\therefore$ The domain of n = $\mathbb{R} - \{0, 3, \frac{3}{2}, \frac{-3}{2}\}$

$, n(X) = \frac{(2X+3)(X-2)}{X(X-3)} \times \frac{X}{(2X+3)} = \frac{X-2}{X-3}$

2

[a] 1 c 2 d 3 c

[b] $\because n_1(X) = \frac{X}{X(X-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$, $n_1(X) = \frac{1}{X-1}$ (1)

$, n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, -1\}$, $n_2(X) = \frac{1}{X-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because 3X^2 + 1 = 5X$

$\therefore 3X^2 - 5X + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore X \approx 1.43$ or $X \approx 0.23$

$\therefore$ The S.S. = {1.43 , 0.23}

[b] 1 $\because z(n_2) = \{-3\} \quad \therefore 6 - a(-3) = 0$

$\therefore 6 + 3a = 0 \quad \therefore 3a = -6 \quad \therefore a = -2$

2 $\because n(X) = n_1(X) - n_2(X)$

$\therefore n(X) = \frac{X^2 - 2X - 15}{X^2 - 9} - \frac{2X + 6}{X^2 - 6X + 9}$

$= \frac{(X-5)(X+3)}{(X-3)(X+3)} - \frac{2(X+3)}{(X-3)(X-3)}$

$\therefore$ The domain of n = $\mathbb{R} - \{3, -3\}$

$, n(X) = \frac{X-5}{X-3} - \frac{2(X+3)}{(X-3)(X-3)}$

$= \frac{(X-5)(X-3) - 2(X+3)}{(X-3)(X-3)}$

$= \frac{X^2 - 8X + 15 - 2X - 6}{(X-3)(X-3)}$

$= \frac{X^2 - 10X + 9}{(X-3)(X-3)} = \frac{(X-1)(X-9)}{(X-3)(X-3)}$

4

[a] $\because 3X + 2y = 4$ (1)

$, X - 3y = 5 \quad \therefore X = 3y + 5$ (2)

Substituting from (2) in (1) :

$\therefore 3(3y + 5) + 2y = 4$

$\therefore 9y + 15 + 2y = 4 \quad \therefore 11y = -11 \quad \therefore y = -1$

Substituting in (2) : $\therefore X = 2$

$\therefore$ The S.S. = {(2 , −1)}

[b] $\because 2P(B) = P(\acute{B}) \quad \therefore 2P(B) = 1 - P(B)$

$\therefore 3P(B) = 1 \quad \therefore P(B) = \frac{1}{3}$

1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3}$

2 $\because$ A , B are mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

5

[a] $\because X - 2y - 1 = 0 \quad \therefore X = 2y + 1$ (1)

$, X^2 - Xy = 0$ (2)

Substituting from (1) in (2) :

$\therefore (2y + 1)^2 - (2y + 1)y = 0$

$\therefore 4y^2 + 4y + 1 - 2y^2 - y = 0$

$\therefore 2y^2 + 3y + 1 = 0$

$\therefore (2y + 1)(y + 1) = 0 \quad \therefore y = -\frac{1}{2}$ or $y = -1$

Substituting in (1) : $\therefore X = 0$ or $X = -1$

$\therefore$ The S.S. = $\{(0, -\frac{1}{2}), (-1, -1)\}$

[b] $\because n(x) = \frac{x(x-3)}{(x-3)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-3)(x^2+2)}{x(x-3)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 3\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

14 El-Beheira

1

1 b 2 a 3 c 4 a 5 c 6 c

2

[a] $\because y - x = 2 \quad \therefore y = x + 2 \quad (1)$

$, x^2 + x y - 4 = 0 \quad (2)$

Substituting from (1) in (2) :

$\therefore x^2 + x(x+2) - 4 = 0$

$\therefore x^2 + x^2 + 2x - 4 = 0$

$\therefore 2x^2 + 2x - 4 = 0$ (Dividing by 2)

$\therefore x^2 + x - 2 = 0$

$(x-1)(x+2) = 0$

$\therefore x = 1$ or $x = -2$

Substituting in (1) : $\therefore y = 3$ or $y = 0$

$\therefore$ The S.S $= \{(1, 3), (-2, 0)\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] Let the measure of the first angle be $x°$

, the measure of the second angle be y°

$\therefore x + y = 90° \quad (1)$

$, x - y = 50° \quad (2)$

Adding (1) and (2) : $\therefore 2x = 140° \quad \therefore x = 70°$

Substituting in (1) : $\therefore y = 20°$

$\therefore$ The measures of the two angles are 70° , 20°

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x) = 3 \quad \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 - 3x + 2 = 0 \quad \therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

4

[a] $\because 3x^2 = 5x - 1 \quad \therefore 3x^2 - 5x + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43$ or $x \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] $\because n_1(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(x) = \frac{x}{x+2}$ (1)

$, \because n_2(x) = \frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$, $\because n_2(x) = \frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4, 0\}$

$\therefore n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

[b] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

15 El-Fayoum

1

1 b 2 b 3 d 4 b 5 a 6 c

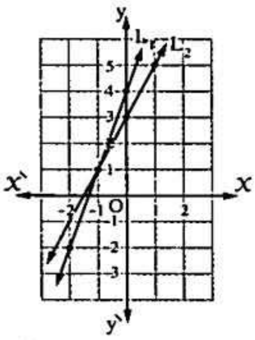
2

[a] $y = 3x + 4$

x	−2	−1	0
y	−2	1	4

$y = 2x + 3$

x	−1	0	1
y	1	3	5



From the graph :

$\therefore$ The S.S. $= \{(-1, 1)\}$

[b] $\because n(X) = \frac{X(X-1)}{(X+1)(X-1)} + \frac{X-5}{(X-5)(X-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1, 1, 5\}$

$, n(X) = \frac{X}{X+1} + \frac{1}{X-1} = \frac{X(X-1)+X+1}{(X+1)(X-1)}$

$= \frac{X^2 - X + X + 1}{(X+1)(X-1)}$

$= \frac{X^2+1}{(X+1)(X-1)}$

3

[a] $\because X^2 + 3X + 5 = 0$

$\therefore a = 1, b = 3, c = 5$

$\therefore X = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 5}}{2 \times 1} = \frac{-3 \pm \sqrt{-11}}{2}$

The S.S. $= \varnothing$

[b] $\because n(X) = \frac{(X-7)(X+7)}{(X-2)(X^2+2X+4)} \div \frac{X+7}{X-2}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -7\}$

$, n(X) = \frac{(X-7)(X+7)}{(X-2)(X^2+2X+4)} \times \frac{X-2}{X+7}$

$= \frac{X-7}{X^2+2X+4}$

$\therefore n(1) = \frac{1-7}{1+2+4} = \frac{-6}{7}$

4

[a] $\because n_1(X) = \frac{(X-2)(X+2)}{(X+3)(X-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-3, 2\}$

$, n_1(X) = \frac{X+2}{X+3}$

$, \because n_2(X) = \frac{X(X^2-X-6)}{X(X^2-9)} = \frac{X(X-3)(X+2)}{X(X-3)(X+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

$, n_2(X) = \frac{X+2}{X+3}$

$\therefore n_1 \neq n_2$

Because the domain of $n_1 \neq$ the domain of n_2

[b] Let X and y be two real numbers

$\because X + y = 9$ $\quad \therefore y = 9 - X$ (1)

$, X^2 - y^2 = 45$ (2)

Substituting from (1) in (2) : $\therefore X^2 - (9 - X)^2 = 45$

$\therefore X^2 - (81 - 18X + X^2) = 45$

$\therefore X^2 - 81 + 18X - X^2 = 45$

$\therefore 18X = 126$ $\quad \therefore X = 7$

Substituting in (1) : $\therefore y = 2$

$\therefore$ The two real numbers are : 7 , 2

5

[a] $\because Z(f) = \{3, 5\}$

$\therefore$ At $X = 3$ $\quad \therefore a \times 3^2 + 3 \times b + 15 = 0$

$\therefore 9a + 3b + 15 = 0$ $\quad \therefore 3a + b + 5 = 0$ (1)

At $X = 5$

$\therefore a \times 5^2 + b \times 5 + 15 = 0$

$\therefore 25a + 5b + 15 = 0$

$\therefore 5a + b + 3 = 0$ (2)

Subtracting (1) from (2) :

$\therefore 2a - 2 = 0$ $\quad \therefore a = 1$

Substituting in (1) : $\therefore 3 \times 1 + b + 5 = 0$

$\therefore 3 + b = -5$ $\quad \therefore b = -8$

[b] $\because P(A) = P(A`)$ $\quad \therefore P(A) = 1 - P(A)$

$\therefore 2P(A) = 1$ $\quad \therefore P(A) = \frac{1}{2}$

1 $\because P(B) = \frac{5}{8} P(A)$

$\therefore P(B) = \frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{5}{16} - \frac{1}{16} = \frac{3}{4}$

16 Beni Suef

1

1 b 2 c 3 d 4 a 5 d 6 c

2

[a] $\because X^2 - 2X - 2 = 0$

$\therefore a = 1, b = -2, c = -2$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2} = 1 \pm \sqrt{3}$

$\therefore$ The S.S. $= \{1 + \sqrt{3} , 1 - \sqrt{3}\}$

[b] $\because n_1(x) = \frac{5x}{5(x+5)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-5\}$

$, n_1(x) = \frac{x}{x+5}$ (1)

$, \because n_2(x) = \frac{x(x+5)}{(x+5)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-5\}$

$, n_2(x) = \frac{x}{x+5}$ (2)

From (1) , (2) : $\therefore n_1 = n_2$

3

[a] $\because x + y = 7 \quad \therefore y = 7 - x$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + (7 - x)^2 = 25$

$\therefore x^2 + 49 - 14x + x^2 - 25 = 0$

$\therefore 2x^2 - 14x + 24 = 0$ (Dividing by 2)

$\therefore x^2 - 7x + 12 = 0 \quad \therefore (x - 3)(x - 4) = 0$

$\therefore x = 3$ or $x = 4$

Substituting in (1) : $\therefore y = 4$ or $y = 3$

$\therefore$ The S.S. $= \{(3 , 4) , (4 , 3)\}$

[b] $\because n(x) = \frac{x^2}{x(x-3)} \div \frac{3x}{(x+3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 3 , -3\}$

$, n(x) = \frac{x}{x-3} \times \frac{(x+3)(x-3)}{3x} = \frac{x+3}{3}$

4

[a] $P(\acute{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

$P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.7 + 0.5 - 0.3 = 0.9$

[b] $\because Z(f) = \{5\} \quad \therefore$ At $x = 5$

$\therefore x^2 - 10x + a = 0 \quad \therefore (5)^2 - 10 \times 5 + a = 0$

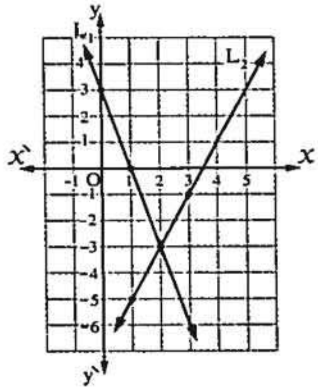
$\therefore 25 - 50 + a = 0 \quad \therefore a = 25$

5

[a] $y = 3 - 3x$, $y = 2x - 7$

x	0	1	2
y	3	0	−3

x	1	2	3
y	−5	−3	−1



From the graph :

$\therefore$ The S.S. $= \{(2 , -3)\}$

[b] $\because n(x) = \frac{x^2 + x + 1}{(x-1)(x^2 + x + 1)} + \frac{(x-2)(x+1)}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1\}$

$, n(x) = \frac{1}{x-1} + \frac{x-2}{x-1} = \frac{x-1}{x-1} = 1$

17 El-Menia

1

1 a   2 c   3 d   4 a   5 b   6 a

2

[a] $\because 3x^2 - 5x + 1 = 0$

$\therefore a = 3 , b = -5 , c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.4$ or $x \approx 0.2$

$\therefore$ The S.S. $= \{1.4 , 0.2\}$

[b] $\because n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \div \frac{x^2 + 2x + 4}{x - 3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , 2\}$

$, n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \times \frac{x-3}{x^2 + 2x + 4} = 1$

3

[a] $\because 2x + y = 1$ (1)

$, x + 2y = 5 \quad \therefore x = 5 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 2(5 - 2y) + y = 1$

$\therefore 10-4y+y=1$ $\therefore -3y=-9$

$\therefore y=3$

Substituting in (2) : $\therefore x=-1$

$\therefore$ The S.S. $=\{(-1,3)\}$

[b] $\because n(x)=\frac{(x-5)(x+3)}{(x-3)(x+3)}-\frac{2(5-x)}{(x-5)(x-3)}$

$\therefore$ The domain of n $=\mathbb{R}-\{3,-3,5\}$

$, n(x)=\frac{x-5}{x-3}+\frac{2(x-5)}{(x-5)(x-3)}=\frac{x-5}{x-3}+\frac{2}{x-3}$

$=\frac{x-3}{x-3}=1$

4

[a] $\because x+y=2$ (1)

$, \frac{1}{x}+\frac{1}{y}=2$ $\therefore x+y=2xy$ (2)

Substituting in (1) from (2) : $\therefore 2=2xy$

$\therefore xy=1$ $\therefore x=\frac{1}{y}$

Substituting in (1) : $\frac{1}{y}+y=2$

Multiplying by y : $\therefore 1+y^2=2y$

$\therefore y^2-2y+1=0$ $\therefore (y-1)^2=0$

$\therefore y=1$

Substituting in (1) : $\therefore x=1$

$\therefore$ The S.S. $=\{(1,1)\}$

[b] $\because n_1(x)=\frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{0,1\}$
$\therefore n_1(x)=\frac{1}{x-1}$ } (1)

$, \because n_2(x)=\frac{x(x^2+x+1)}{x(x^3-1)}$

$=\frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{0,1\}$
$, n_2(x)=\frac{1}{x-1}$ } (2)

From (1) and (2) : $\therefore n_1=n_2$

5

[a] $\because n(x)=\frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x)=\frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1}=\mathbb{R}-\{0,2\}$

$, n^{-1}(x)=\frac{x^2+2}{x}$

[b] **1** $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.3+0.6-0.2=0.7$

2 $P(A-B)=P(A)-P(A\cap B)$

$=0.3-0.2=0.1$

18 Assiut

1

1 b	2 c	3 d	4 c	5 d	6 a

2

[a] $\because 3x-y+4=0$ (1)

$, y=2x+3$ (2)

Substituting from (2) in (1) :

$\therefore 3x-(2x+3)+4=0$

$\therefore 3x-2x-3+4=0$ $\therefore x=-1$

Substituting in (2) : $\therefore y=1$

$\therefore$ The S.S. $=\{(-1,1)\}$

[b] $\because n(x)=\frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)}\div\frac{x+7}{x-2}$

$\therefore$ The domain of n $=\mathbb{R}-\{2,-7\}$

$, n(x)=\frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)}\times\frac{x-2}{x+7}$

$=\frac{x-7}{x^2+2x+4}$

$\therefore n(1)=\frac{1-7}{1+2+4}=-\frac{6}{7}$

3

[a] $\because x(x-1)=5$ $\therefore x^2-x-5=0$

$\therefore a=1, b=-1, c=-5$

$\therefore x=\frac{1\pm\sqrt{(-1)^2-4\times1\times(-5)}}{2\times1}=\frac{1\pm\sqrt{21}}{2}$

$\therefore x\approx 2.8$ or $x\approx -1.8$

$\therefore$ The S.S. $=\{2.8,-1.8\}$

[b] $\because n_1(x)=\frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-3,2\}$ $, n_1(x)=\frac{x+2}{x+3}$

$, \because n_2(x)=\frac{x(x^2-x-6)}{x(x^2-9)}=\frac{x(x-3)(x+2)}{x(x-3)(x+3)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{0,3,-3\}$

$, n_2(x)=\frac{x+2}{x+3}$

$\therefore n_1(x)=n_2(x)$ for all values of $x\in\mathbb{R}-\{0,3,-3,2\}$

4

[a] $\because x - y = 2 \qquad \therefore x = y + 2 \qquad (1)$

$, x^2 + y^2 = 20 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (y+2)^2 + y^2 = 20$

$\therefore y^2 + 4y + 4 + y^2 - 20 = 0$

$\therefore 2y^2 + 4y - 16 = 0$ (Dividing by 2)

$\therefore y^2 + 2y - 8 = 0$

$\therefore (y+4)(y-2) = 0$

$\therefore y = -4$ or $y = 2$

Substituting in (1) :

$\therefore x = -2$ or $x = 4$

$\therefore$ The S.S. $= \{(-2 , -4) , (4 , 2)\}$

[b] $\because Z(f) = \{5\}$

$\therefore (5)^3 - 3(5)^2 + a = 0 \qquad \therefore 125 - 75 + a = 0$

$50 + a = 0 \qquad \therefore a = -50$

5

[a] $\because n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$

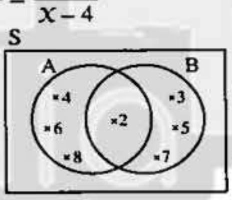
$\therefore$ The domain of $n = \mathbb{R} - \{4 , 3\}$

$, n(x) = \frac{1}{x-4} + 1 = \frac{1+x-4}{x-4} = \frac{x-3}{x-4}$

[b] 1 $P(A) = \frac{4}{7}$

$, P(\acute{B}) = 1 - P(B)$

$= 1 - \frac{4}{7} = \frac{3}{7}$



2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{4}{7} + \frac{4}{7} - \frac{1}{7} = 1$

19 Souhag

1

1 d 2 c 3 b 4 a 5 d 6 c

2

[a] $\because x(x-1) = 4 \qquad \therefore x^2 - x - 4 = 0$

$\therefore a = 1 , b = -1 , c = -4$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$x \approx 2.6$ or $x \approx -1.6$

$\therefore$ The S.S. $= \{2.6 , -1.6\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$

$, n_1(x) = \frac{1}{x-1} \qquad (1)$

$, \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$

$, n_2(x) = \frac{1}{x-1} \qquad (2)$

from (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because x - y = 0 \qquad \therefore x = y \qquad (1)$

$, x^2 + xy + y^2 = 27 \qquad (2)$

Substituting from (1) in (2) :

$\therefore y^2 + y^2 + y^2 = 27 \qquad \therefore 3y^2 = 27$

$\therefore y^2 = 9 \qquad \therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2 , 1\}$

$, n^{-1}(x) = \frac{x-1}{x}$

4

[a] $\because 2x - y = 5 \qquad (1)$

$, x + y = 4 \qquad (2)$

Adding (1) and (2) : $\therefore 3x = 9 \quad \therefore x = 3$

Substituting in (2) : $\therefore y = 1$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 2 , 3\}$

$\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

5

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$, $n(x) = 1$

[b] $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

20 Qena

1

1 d 2 c 3 a 4 b 5 c 6 a

2

[a] $\because X - 2 = 0 \quad \therefore X = 2 \quad (1)$

$, y^2 - 3Xy + 5 = 0 \quad (2)$

Substituting from (1) in (2) : $\therefore y^2 - 6y - 5 = 0$

$\therefore (y-5)(y-1) = 0$

$\therefore y = 5$ or $y = 1$

$\therefore$ The S.S. $= \{(2, 5), (2, 1)\}$

[b] $\because n(X) = \frac{5}{X-3} - \frac{4}{X-3}$

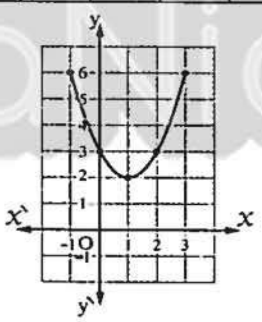
$\therefore$ The domain of $n = \mathbb{R} - \{3\}$

$, n(X) = \frac{5-4}{X-3} = \frac{1}{X-3}$

3

[a] $f(X) = X^2 - 2X + 3$

X	-1	0	1	2	3
y	6	3	2	3	6



From the graph : $\therefore$ The S.S. $= \varnothing$

[b] $\because n(X) = \frac{(X+4)(X-3)}{(X+4)(X+1)}$

$\therefore n^{-1}(X) = \frac{(X+4)(X+1)}{(X+4)(X-3)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{-4, 3, -1\}$

$, n^{-1}(X) = \frac{X+1}{X-3} \quad \therefore n^{-1}(0) = \frac{0+1}{0-3} = -\frac{1}{3}$

4

[a] $\because 2X^2 - 5X + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore X \approx 2.28$ or $X \approx 0.22$

$\therefore$ The S.S. $= \{2.28, 0.22\}$

[b] $\because n_1(X) = \frac{(X+1)(X^2 - X + 1)}{X(X^2 - X + 1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$

$, n_1(X) = \frac{X+1}{X}$ (1)

$, \because n_2(X) = \frac{X^2(X+1) + X + 1}{X(X^2+1)} = \frac{(X+1)(X^2+1)}{X(X^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

$, n_2(X) = \frac{X+1}{X}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

5

[a] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

3 $P(A - B) = P(A) - P(A \cap B)$

$= 0.8 - 0.6 = 0.2$

[b] $\because n(X) = \frac{X(X+2)}{(X-3)(X^2+3X+9)} \div \frac{X+2}{X^2+3X+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -2\}$

$\therefore n(X) = \frac{X(X+2)}{(X-3)(X^2+3X+9)} \times \frac{X^2+3X+9}{X+2}$

$= \frac{X}{X-3}$

21 Luxor

1

1 d 2 b 3 c 4 b 5 d 6 a

2

[a] Let $n_1(X) = \frac{X-4}{X^2 - 5X + 6}$

$\therefore n_1(X) = \frac{X-4}{(X-2)(X-3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2, 3\}$

$,$ let $n_2(X) = \frac{2X}{X^3 - 9X}$

$\therefore n_2(X) = \frac{2X}{X(X^2-9)} = \frac{2X}{X(X-3)(X+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

$\therefore$ The common domain $= \mathbb{R} - \{2, 3, 0, -3\}$

[b] $\because y + 2x = 7 \quad \therefore y = 7 - 2x$ (1)

$, 2x^2 + x + 3y = 19$ (2)

Substituting from (1) in (2) :

$\therefore 2x^2 + x + 3(7 - 2x) = 19$

$\therefore 2x^2 + x + 21 - 6x = 19$

$\therefore 2x^2 - 5x + 2 = 0 \quad \therefore (2x - 1)(x - 2) = 0$

$\therefore x = \frac{1}{2}$ or $x = 2$

Substituting (1) : $\therefore y = 6$ or $y = 3$

$\therefore$ The S.S. $= \left\{\left(\frac{1}{2}, 6\right), (2, 3)\right\}$

3

[a] $\because n(x) = \frac{x-3}{(x-3)(x-4)} + \frac{x-3}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4\}$

$, n(x) = \frac{1}{x-4} + 1 = \frac{1}{x-4} + \frac{x-4}{x-4} = \frac{x-3}{x-4}$

[b] 1 The probability of the student succeeded in Math $= \frac{30}{40} = \frac{3}{4}$

2 The probability of the student succeeded in Science only $= \frac{4}{40} = \frac{1}{10}$

3 The probability of the succeeded in one of them at least $= \frac{34}{40} = \frac{17}{20}$

4

[a] $\because 2x^2 - x - 2 = 0$

$\therefore a = 2, b = -1, c = -2$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 2 \times (-2)}}{2 \times 2}$

$= \frac{1 \pm \sqrt{17}}{4} = \frac{1 \pm 4.12}{4}$

$\therefore x \approx 1.28$ or $x \approx -0.78$

$\therefore$ The S.S. $= \{1.28, -0.78\}$

[b] $\because n_1(x) = \frac{x}{(x-1)(x+1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{1, -1\}$
$, n_1(x) = \frac{x}{(x-1)(x+1)}$ } (1)

$, \because n_2(x) = \frac{5x}{5(x^2-1)} = \frac{5x}{5(x-1)(x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{1, -1\}$
$, n_2(x) = \frac{x}{(x-1)(x+1)}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \left\{-\frac{3}{2}, 2, 0, \frac{3}{2}\right\}$

$, n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)}$

$= \frac{x-3}{x-2}$

[b] $\because x + 2y = 8$ (1)

$, 3x + y = 9$ (multiplying by -2)

$\therefore -6x - 2y = -18$ (2)

Adding (1) and (2) : $-5x = -10$

$\therefore x = 2$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(2, 3)\}$

22 Aswan

1

1 c	2 b	3 d	4 c	5 d	6 c

2

[a] $\because 3x - y = -4$ (1)

$, y - 2x = 3 \quad \therefore y = 3 + 2x$ (2)

Substituting from (2) in (1) :

$\therefore 3x - (3 + 2x) = -4$

$\therefore 3x - 3 - 2x = -4$

$\therefore x = -1$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(-1, 1)\}$

[b] $\because n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3\}$

$, n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3}$

$= \frac{x+1}{x-3}$

3

[a] $\because x - y = 1 \quad \therefore x = y + 1$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$ (Dividing by 2)

$\therefore y^2 + y - 12 = 0 \qquad \therefore (y-3)(y+4) = 0$

$\therefore y = 3$ or $y = 4$

Substituting in (1) : $\therefore x = 4$ or $x = 5$

$\therefore$ The S.S. $= \{(4, 3), (5, 4)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2, 1\}$

, $n^{-1}(x) = \frac{x-1}{x}$

4

[a] $\because 2x^2 - 5x + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore$ The S.S. $= \left\{\frac{5+\sqrt{17}}{4}, \frac{5-\sqrt{17}}{4}\right\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 2, 3\}$

, $n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

5

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-4\}$
, $n_1(x) = \frac{x}{x+4}$ } (1)

, $\because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-4\}$
, $n_2(x) = \frac{x}{x+4}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cup B) = P(A) + P(B)$

$\therefore \frac{7}{12} = \frac{1}{3} + P(B)$

$\therefore P(B) = \frac{7}{12} - \frac{1}{3} = \frac{7-4}{12} = \frac{3}{12} = \frac{1}{4}$

23 New Valley

1

1 b 2 a 3 a 4 d 5 c 6 d

2

[a] $\because n(x) = \frac{(x-2)(x+2)}{(x+2)(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, -3\}$

, $n(x) = \frac{x-2}{x+3}$

[b] $\because x^2 + y^2 = 17$ (1)

, $y - x = 3 \qquad \therefore y = x + 3$ (2)

Substituting from (2) in (1) : $\therefore x^2 + (x+3)^2 = 17$

$\therefore x^2 + x^2 + 6x + 9 = 17$

$\therefore 2x^2 + 6x - 8 = 0$ (Dividing by 2)

$\therefore x^2 + 3x - 4 = 0 \qquad \therefore (x+4)(x-1) = 0$

$\therefore x = -4$ or $x = 1$

Substituting in (2) : $\therefore y = -1$ or $y = 4$

$\therefore$ The S.S. $= \{(-4, -1), (1, 4)\}$

3

[a] $\because 3x - 2y = 4$ (1)

, $x + 3y = 5 \qquad \therefore x = 5 - 3y$ (2)

Substituting from (2) in (1) : $\therefore 3(5-3y) - 2y = 4$

$\therefore 15 - 9y - 2y = 4 \quad \therefore -11y = -11 \quad \therefore y = 1$

Substituting in (2) : $x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{x}{x+2} \div \frac{2x^2 - 4x}{x^2 - 4}$

$= \frac{x}{x+2} \div \frac{2x(x-2)}{(x-2)(x+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 0\}$

, $n(x) = \frac{x}{x+2} \times \frac{(x-2)(x+2)}{2x(x-2)} = \frac{1}{2}$

4

[a] $\because n_1(x) = \frac{(x-1)(x^2+x+1)}{x(x^2+x+1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$
, $n_1(x) = \frac{x-1}{x}$ } (1)

, $n_2(x) = \frac{x^2(x-1) + (x-1)}{x(x^2+1)} = \frac{(x-1)(x^2+1)}{x(x^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$
, $n_2(x) = \frac{x-1}{x}$ } (2)
from (1) and (2) : $\therefore n_1 = n_2$

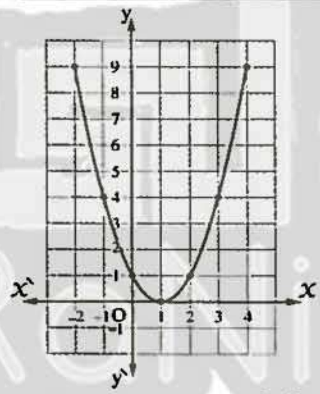
[b] $\because n(x) = \frac{3x}{x(x-3)} - \frac{x}{x-3}$
$\therefore$ The domain of $n = \mathbb{R} - \{0, 3\}$
, $n(x) = \frac{3}{x-3} - \frac{x}{x-3} = \frac{3-x}{x-3} = \frac{-(x-3)}{(x-3)} = -1$

5

[a] 1 $P(\acute{A}) = 1 - P(A) = 1 - \frac{1}{5} = \frac{4}{5}$
2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= \frac{1}{5} + \frac{3}{5} - \frac{1}{10} = \frac{7}{10}$
3 $P(B - A) = P(B) - P(A \cap B)$
$= \frac{3}{5} - \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$

[b] $f(x) = x^2 - 2x + 1$

x	−2	−1	0	1	2	3	4
y	9	4	1	0	1	4	9



From the graph : $\therefore$ The S.S. $= \{1\}$

24 South Sinai

1

1 a 2 b 3 c 4 d 5 b 6 b

2

[a] $\because x^2 - 2x - 6 = 0$
$\therefore a = 1, b = -2, c = -6$
$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$
$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$
$\therefore x = 3.65$ or $x = -1.65$
$\therefore$ The S.S. $= \{3.65, -1.65\}$

[b] $\because n(x) = \frac{x}{x+2} + \frac{2x^3}{x^2(x+2)}$
$\therefore$ The domain of $n = \mathbb{R} - \{-2, 0\}$
, $n(x) = \frac{x}{x+2} + \frac{2x}{x+2} = \frac{3x}{x+2}$

3

[a] $\because n(x) = \frac{x(x+2)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{x+2}$
$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$
, $n(x) = \frac{x}{x-2}$

[b] $\because 2x - y = 3$ (1)
, $x + 2y = 4$ $\therefore x = 4 - 2y$ (2)
Substituting from (2) in (1) : $\therefore 2(4-2y) - y = 3$
$\therefore 8 - 4y - y = 3$ $\therefore 8 - 5y = 3$
$\therefore -5y = -5$ $\therefore y = 1$
Substituting in (2) : $\therefore x = 2$
$\therefore$ The S.S. $= \{(2, 1)\}$

4

[a] $\because n_1(x) = \frac{x}{x(x+1)}$
$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, -1\}$
, $n_1(x) = \frac{1}{x+1}$ } (1)
, $\because n_2(x) = \frac{x^2(x^2-x+1)}{x^2(x^3+1)}$
$= \frac{x^2(x^2-x+1)}{x^2(x+1)(x^2-x+1)}$
$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, -1\}$
, $n_2(x) = \frac{1}{x+1}$ } (2)
from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - y = 7$ $\therefore x = y + 7$ (1)
, $xy = 60$ (2)
Substituting from (1) in (2) : $\therefore (y+7)y = 60$
$\therefore y^2 + 7y - 60 = 0$ $\therefore (y+12)(y-5) = 0$
$\therefore y = -12$ or $y = 5$
Substituting in (1) : $\therefore x = -5$ or $x = 12$
$\therefore$ The S.S. $= \{(-5, -12), (12, 5)\}$

5

[a] $\because n(x) = \frac{x+1}{(x+2)(x+1)} - \frac{x+2}{(x+2)(x-2)}$
$\therefore$ The domain of $n = \mathbb{R} - \{-2, -1, 2\}$

, $n(x) = \frac{1}{x+2} - \frac{1}{x-2}$
$= \frac{x-2-(x+2)}{(x+2)(x-2)} = \frac{x-2-x-2}{(x+2)(x-2)}$
$= \frac{-4}{(x+2)(x-2)}$

[b] $\because$ A and B are mutually exclusive events
$\therefore P(A \cup B) = P(A) + P(B)$
$\therefore P(B) = P(A \cup B) - P(A) = \frac{5}{12} - \frac{1}{4} = \frac{1}{6}$

25 North Sinai

1

1 c 2 c 3 d 4 d 5 a 6 b

2

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= \frac{1}{2} + \frac{2}{5} - \frac{1}{5} = \frac{7}{10}$

2 $P(A - B) = P(A) - P(A \cap B)$
$= \frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

[b] $\because n_1(x) = \frac{-1}{(x-3)(x+3)}$
$\therefore$ The domain of $n_1 = \mathbb{R} - \{3, -3\}$
, $\because n_2(x) = \frac{7}{x}$
$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$
$\therefore$ The common domain $= \mathbb{R} - \{3, -3, 0\}$

3

[a] $\because x^2 - 2x - 4 = 0$
$\therefore a = 1, b = -2, c = -4$
$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm \sqrt{20}}{2}$
$= \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$
$\therefore x \approx 3.24$ or $x \approx -1.24$
$\therefore$ The S.S. $= \{3.24, -1.24\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$
$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, -3\}$
, $n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$

4

[a] $\because x - y = 0$ $\therefore x = y$ (1)
, $xy = 16$ (2)

Substituting from (1) in (2) : $\therefore y^2 = 16$
$\therefore y = 4$ or $y = -4$
Substituting in (1) : $\therefore x = 4$ or $x = -4$
$\therefore$ The S.S. $= \{(4, 4), (-4, -4)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$
$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$
, $n_1(x) = \frac{1}{x-1}$ } (1)

, $\because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$
$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$
$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 1\}$
, $n_2(x) = \frac{1}{x-1}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

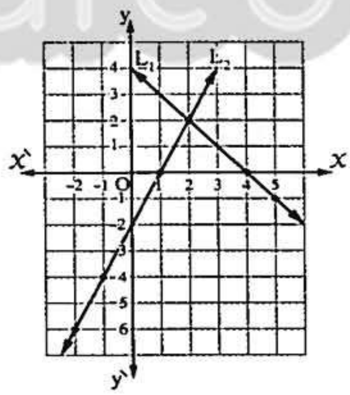
5

[a] $\because n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$
$\therefore$ The domain of $n = \mathbb{R} - \{1\}$
, $n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \times \frac{x^2+x+1}{x-1} = 1$

[b] $x = 4 - y$ $y = 2x - 2$

x	2	4	5
y	2	0	−1

x	1	−1	−2
y	0	−4	−6



From the graph : $\therefore$ the S.S. $= \{(2, 2)\}$

26 Red Sea

1

1 c 2 b 3 a 4 b 5 c 6 d

2

[a] $\because 2x - y = 3$ (1)

$, x + 2y = 4 \quad \therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4 - 2y) - y = 3 \quad \therefore 8 - 4y - y = 3$

$\therefore 8 - 5y = 3 \quad \therefore -5y = -5 \quad \therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2 , 1)\}$

[b] $\because n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = \frac{x^2}{x-1} - \frac{x}{x-1} = \frac{x^2 - x}{x-1} = \frac{x(x-1)}{x-1} = x$

3

[a] $\because x^2 - x - 4 = 0$

$\therefore a = 1 , b = -1 , c = -4$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$\therefore x \approx 2.56$ or $x \approx -1.56$

[b] $\because n_1(x) = \frac{(x+1)(x^2 - x + 1)}{x(x^2 - x + 1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$
$, n_1(x) = \frac{x+1}{x}$ } (1)

$, \because n_2(x) = \frac{x^2(x+1) + x + 1}{x(x^2+1)} = \frac{x + 1(x^2+1)}{x(x^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$
$, n_2(x) = \frac{x+1}{x}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because x - y = 1 \quad \therefore x = y + 1$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$

$\therefore y^2 + y - 12 = 0 \quad \therefore (y+4)(y-3) = 0$

$\therefore y = -4$ or $y = 3$

Substituting in (1) : $\therefore x = -3$ or $x = 4$

$\therefore$ The S.S. $= \{(-3 , -4) , (4 , 3)\}$

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x-3)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2 , 3\}$

$, n^{-1}(x) = \frac{x-3}{x}$

2 $\because n^{-1}(x) = 2 \quad \therefore \frac{x-3}{x} = 2$

$\therefore x - 3 = 2x \quad \therefore x = -3$

5

[a] $\because n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+3)} \times \frac{x+3}{x^2 + 2x + 4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$

$, n(x) = 1$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

27 Matrouh

1

1 a 2 c 3 a 4 b 5 c 6 d

2

[a] $\because x + \frac{1}{x} + 3 = 0$ (Multiplying by x)

$\therefore x^2 + 1 + 3x = 0 \quad \therefore x^2 + 3x + 1 = 0$

$\therefore a = 1 , b = 3 , c = 1$

$\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-3 \pm \sqrt{5}}{2}$

$\therefore x \approx -0.38$ or $x \approx -2.62$

The S.S. $= \{-0.38 , -2.62\}$

[b] $\because n(x) = \frac{(x-1)(x+1)}{x(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 1\}$

$, n(x) = \frac{x+1}{x}$

3

[a] $\because n(x) = \frac{x-1}{(x-1)(x+1)} \div \frac{x(x-5)}{(x+1)(x-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1 , 5 , 0\}$

$, n(x) = \frac{x-1}{(x-1)(x+1)} \times \frac{(x+1)(x-5)}{x(x-5)} = \frac{1}{x}$

[b] Let the two positive numbers be x and y

$\therefore x + y = 9 \quad \therefore y = 9 - x$ (1)

$, x^2 - y^2 = 27$ (2)

substituting from (1) in (2) :

$\therefore x^2 - (9-x)^2 = 27$

$\therefore x^2 - (81 + 18x - x^2) = 27$

$\therefore x^2 - 81 + 18x - x^2 = 27$

$\therefore 18x = 108 \qquad \therefore x = 6$

Substituting in (1) : $\therefore$ y = 3

$\therefore$ The two positive numbers are : 6 , 3

4

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$, $n_1(x) = \frac{1}{x-1}$ (1)

, $\because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)} = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$, $n_2(x) = \frac{1}{x-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{3x}{(x+1)(x-2)} - \frac{x-1}{x^2-1}$

$= \frac{3x}{(x+1)(x-2)} - \frac{x-1}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1 , 2 , 1\}$

, $n(x) = \frac{3x}{(x+1)(x-2)} - \frac{1}{x+1}$

$= \frac{3x-(x-2)}{(x+1)(x-2)} = \frac{3x-x+2}{(x+1)(x-2)}$

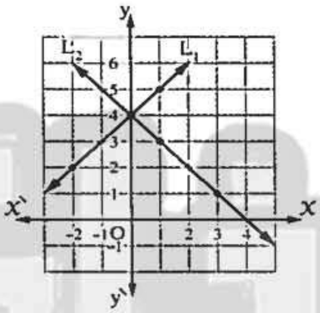
$= \frac{2x+2}{(x+1)(x-2)} = \frac{2(x+1)}{(x+1)(x-2)} = \frac{2}{x-2}$

[b] $y = x + 4$

x	1	0	−2
y	5	4	2

$x = 4 - y$

x	3	1	0
y	1	3	4



From the graph : The S.S. = {(0 , 4)}

Governorates' Examinations

1 Giza Governorate

Answer the following questions :

1 Choose the correct answer :

(1) The set of zeroes of the function f : where $f(X) = -3X$ is ....

(a) $\{0\}$ (b) $\{3\}$ (c) $\{-3\}$ (d) $\mathbb{R} - \{3\}$

(2) If $A \subset S$ of a random experiment , $P(A) = P(\acute{A})$, then $P(A) =$ ....

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

(3) If X is a negative number, then the greatest number of the following is ....

(a) $5X$ (b) $\frac{5}{X}$ (c) $5 + X$ (d) $5 - X$

(4) The domain of the function $f : f(X) = \frac{X-3}{4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-4\}$ (c) $\mathbb{R} - \{-4 , 3\}$ (d) $\varnothing$

(5) If the sum of ages of a father and his sun now is 47 years , then the sum of their ages after 10 years = ... years.

(a) 27 (b) 37 (c) 57 (d) 67

(6) If the two equations $X + 2y = 1$, $2X + ky = 2$ has only one solution , then $k \neq$ ....

(a) 1 (b) 2 (c) 4 (d) -4

---

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$X + 3y = 7$, $5X - y = 3$

[b] Find n (X) in its simplest form , showing the domain of n :

$$n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{X + 5}{X^2 + 4X - 5}$$

---

3 [a] Find in $\mathbb{R}$ the solution set of the following equation by using the general rule :

$X^2 - 4X + 1 = 0$ rounding the results to two decimal places.

[b] If $n_1(X) = \frac{2X}{2X + 6}$, $n_2(X) = \frac{X^2 + 3X}{X^2 + 6X + 9}$ **, then prove that :** $n_1 = n_2$

4 **[a]** If A and B are two events from a sample space of a random experiment , and $P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, **then find :**

(1) $P(A \cup B)$ (2) $P(A - B)$

[b] Find n (x) in its simplest form , showing the domain of n :

$$n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \times \frac{x + 1}{x^2 + 2x + 4}$$

---

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :**

$x - y = 1$, $x^2 - y^2 = 25$

[b] If $n(x) = \dfrac{x^2 - 3x}{(x - 3)(x^2 + 2)}$

, **then find :** $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1} .

2 Alexandria Governorate

Answer the following questions :

1 **Choose the correct answer from those given ones :**

(1) If A , B are two mutually exclusive events , $P(B) = 0.5$ and $P(A \cup B) = 0.7$, then $P(A) = \ldots\ldots\ldots\ldots$

(a) 0.02 (b) 0.2 (c) 0.5 (d) 0.13

(2) $(x + 1)^2 = \ldots\ldots\ldots\ldots$

(a) $x^2 + 1$ (b) $x^2 - 1$ (c) $x^2 - x + 1$ (d) $x^2 + 2x + 1$

(3) The additive inverse of the fraction $\dfrac{3}{x^2 + 1}$ is $\ldots\ldots\ldots\ldots$

(a) $\dfrac{-3}{x^2 + 1}$ (b) $\dfrac{x^2 + 1}{3}$ (c) $\dfrac{x^2 + 1}{-3}$ (d) $\dfrac{3}{x^2 - 1}$

(4) If x is a negative real number , then the greatest number of the following numbers is $\ldots\ldots\ldots\ldots$

(a) $3 + x$ (b) $3x$ (c) $3 - x$ (d) $\dfrac{3}{x}$

(5) If $x = 2$ and $y = 3$, then $(y - 2x)^{10} = \ldots\ldots\ldots\ldots$

(a) 10 (b) -1 (c) -10 (d) 1

(6) The point of intersection of the two straight lines $x = 2$ and $x + y = 6$ is $\ldots\ldots\ldots\ldots$

(a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

2 [a] If A and B are two events of the sample space (S) of a random experiment such that :

$P(A) = 0.7$, $P(A \cap B) = 0.3$ **Find :** $P(A - B)$

[b] **Find n (X) in the simplest form showing the domain of n , where :**

$$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} - \frac{9 - X^2}{X^2 + X - 6}$$

---

3 [a] **Find the common domain of n_1 , n_2 to be equal such that :**

$$n_1(X) = \frac{X^2 + 3X + 2}{X^2 - 4} \quad , \quad n_2(X) = \frac{X^2 - 1}{X^2 - 3X + 2}$$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $X + y = 7$, $X^2 + y^2 = 25$

---

4 [a] **Find n (X) in the simplest form showing the domain of n , where :**

$$n(X) = \frac{X}{X - 2} \div \frac{X + 3}{X^2 - X - 2}$$

[b] **Find in $\mathbb{R}$ the solution set of the equation :** $3X^2 - 5X - 4 = 0$

, by using the general rule , rounding the result to two decimal places.

---

5 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :**

$X + y = 4$, $2X - y = 2$

[b] If set of zeroes of the function $f : f(X) = aX^2 + X + b$ is $\{0 , 1\}$

find the value of each two constants a and b

3 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer :**

(1) Twice the number X subtracted by 3 is ....

(a) $X - 3$ (b) $2X + 3$ (c) $2X - 3$ (d) $3 - 2X$

(2) The domain of the function f where $f(X) = \frac{X + 2}{5X}$ is ....

(a) $\mathbb{R} - \{5\}$ (b) $\mathbb{R} - \{-5\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{\text{zero}\}$

(3) If $P(A) = 4P(\acute{A})$, then $P(A) =$ ....

(a) 0.8 (b) 0.6 (c) 0.4 (d) 0.2

(4) If X is a negative number , then the greatest number of the following is ....

(a) $5 - X$ (b) $5 + X$ (c) $\frac{5}{X}$ (d) $5X$

(5) If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 6 (d) 5

(6) If $x^2 - y^2 = 2(x + y)$ where $(x + y) \neq$ zero , then $(x - y) =$ ....

(a) 2 (b) 4 (c) 6 (d) 8

---

2 [a] If $n(x) = \frac{x^3 - 8}{x^2 - x - 2} \div \frac{x^2 + 2x + 4}{2x^2 - x - 3}$

Find n (x) in its simplest form showing the domain of n

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x = 1 - y$, $x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

---

3 [a] If A , B are two events in a random experiment , P (A) = 0.7 , P (B) = 0.6 and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

[b] **Find the solution set of the two equations :** $y - x = 3$, $x^2 + y^2 - xy = 13$ in $\mathbb{R}^2$

---

4 [a] If $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x - 5}{x^2 - 6x + 5}$ Find n (x) in its simplest form , showing the domain of n

[b] By using the formula , find in $\mathbb{R}$ the solution set of the equation : $x^2 - 2x - 6 = 0$

(Approximate to the nearest one decimal)

---

5 [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$, **prove that :** $n_1 = n_2$

[b] If $n(x) = \frac{x - 2}{x + 1}$

Find : (1) The domain of n^{-1} (2) $n^{-1}(3)$

4 El-Sharkia Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

(1) In the experiment of rolling a regular die once , the probability of appearance of an even number on the upper face = ...

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{5}{6}$

(2) The set of zeroes of the function $f : f(X) = X^2 + 1$ is ....

(a) $\{1\}$ (b) $\{-1\}$ (c) $\{-1, 1\}$ (d) $\varnothing$

(3) The point of intersection of the two straight lines $X + 2 = 0$ and $y - 3 = 0$ is ....

(a) $(-2, -3)$ (b) $(-2, 3)$ (c) $(2, -3)$ (d) $(2, 3)$

(4) If $2^5 \times 3^5 = m \times 6^4$, then m = ...

(a) 1 (b) 2 (c) 3 (d) 6

(5) The domain of the multiplicative inverse of the algebraic fraction $\frac{X + 2}{X + 5}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-5\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{-2, -5\}$

(6) If $(7^{a-2}, 3) = (1, b + 5)$, then a + b = ...

(a) – 1 (b) zero (c) 1 (d) 2

---

2 **[a] By using the general rule solve in $\mathbb{R}$ the equation :** $X(X - 1) = 4$ taking $\sqrt{17} \approx 4.12$

[b] If A and B are two events in a sample space for a random experiment, and if

$P(A) = 0.8$, $P(B) = 0.7$ and $P(A \cap B) = 0.6$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence one of the two events at least.

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $X - y = 4$, $3X + 2y = 7$

[b] If $n_1(X) = \frac{X^2 - 3X + 9}{X^3 + 27}$, $n_2(X) = \frac{2}{2X + 6}$ **Prove that :** $n_1 = n_2$

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $X - y = 1$, $X^2 - y^2 = 5$

[b] Find n (X) in the simplest form showing the domain :

$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} - \frac{9 - X^2}{X^2 + X - 6}$ **and find :** n (58)

---

5 **[a]** If $n(X) = \frac{X^3 - X}{X^2 - 2X + 1} \times \frac{2X - 2}{X^2 + X}$

Find : n (X) in the simplest form showing the domain.

[b] If the set of zeroes of the function f where $f(X) = \frac{aX^2 - 6X + 8}{bX - 4}$ is $\{4\}$ and its domain is $\mathbb{R} - \{2\}$, **then find :** a, b

5 El-Monofia Governorate

Answer the following questions :

1 Choose the correct answer :

(1) If $a < \sqrt{3} < b$, then (a , b) is ....

(a) (0 , 1) (b) (2.5 , 3.5) (c) (1 , 2) (d) (2 , 3)

(2) If the curve of the quadratic function does not intersect the X-axis at any point , then the number of solutions of the equation $f(X) = 0$ in $\mathbb{R}$ is ....

(a) zero (b) one solution. (c) two solutions. (d) an infinite number.

(3) If $2^8 \times 3^8 = X \times 6^8$, then $X =$ ....

(a) 2 (b) 3 (c) 6 (d) 1

(4) The set of zeroes of the function $f : f(X) = \frac{X^2 - 9}{X - 3}$ is ....

(a) $\{3\}$ (b) $\{-3\}$ (c) $\{3 , -3\}$ (d) $\varnothing$

(5) If $f(X) = 6X^2 + 3X(1 - 2X)$ is a polynomial function , then its degree is ....

(a) first. (b) second. (c) third. (d) fourth.

(6) If A and B are two mutually exclusive events of random experiment then : $P(A \cap B) =$ ....

(a) $P(A \cup B)$ (b) $P(A) + P(B)$ (c) $\varnothing$ (d) zero

---

2 [a] If $(2a + b , 3) = (18 , a - b)$:

Find the value of a and b (Indicating the steps of the solution).

[b] By using the general formula , find in $\mathbb{R}$ the solution set for the following equation :

$(X - 4)(X - 2) = 1$ (knowing that : $\sqrt{2} \approx 1.41$)

---

3 [a] If the domain of the function n where : $n(X) = \frac{4}{X + a} + \frac{b}{2X}$

is $\mathbb{R} - \{0 , -5\}$ and n (3) = 1 , find the values of a and b

[b] Find n (X) in the simplest form showing the domain where :

$$n(X) = \frac{X^2 + 4X + 3}{X - 1} \div \frac{X^2 + 3X}{X^2 - X}$$

---

4 **[a] Find n (X) in the simplest form showing the domain where :**

$n(X) = \frac{X^2 + X + 1}{X^4 - X} + \frac{X + 3}{3 - 2X - X^2}$ and if n (a) = – 2 , find the value of a

[b] A right angled triangle in which the length of one of the sides of right angled is 5 cm. and its perimeter is 30 cm. Find the area of the triangle.
(Indicating the steps of the solution).

---

5 [a] If $n_1(X) = \frac{X^2 - 4}{X^2 + X - 6}$, $n_2(X) = \frac{X^3 - X^2 - 6X}{X^3 - 9X}$

Prove that : $n_1(X) = n_2(X)$ for all values of X which belong to the common domain and find this domain.

[b] If A and B are two events of the sample space of a random experiment
$P(A) = \frac{5}{9}$, $P(B) = \frac{2}{9}$, $P(A \cap B) = \frac{1}{9}$

Find : (1) $P(A \cup B)$

(2) The probability of non occurrence any of the two events.

(3) The probability of occurrence of event A only.

6 El-Gharbia Governorate

Answer the following questions :

1 Choose the correct answer from those given :

(1) If the solution set of the equation $X^2 - aX + 4 = 0$ is $\{-2\}$, then a = ...

(a) -2 (b) -4 (c) 2 (d) 4

(2) If $n(X) = \frac{X + 2}{X - 5}$, then the domain of n^{-1} is ....

(a) $\{2, -5\}$ (b) $\{-2, 5\}$ (c) $\mathbb{R} - \{-2, 5\}$ (d) $\mathbb{R} - \{2, -5\}$

(3) If A and B are two mutually exclusive events of a random experiment , if $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, then P (B) = ...

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1

(4) The set of zeroes of the function $f : f(X) = \frac{X^2 - X - 2}{X^2 + 4}$ is ....

(a) $\{2, -2\}$ (b) $\{-2, -1\}$ (c) $\{2, -1\}$ (d) $\{1, -1\}$

(5) The point of intersection of the two straight lines : y = 2 , $X + y = 6$ is ....

(a) (4 , 2) (b) (2 , 4) (c) (2 , 2) (d) (4 , 4)

(6) If the curve of the function $f : f(X) = X^2 - X + c$ passing through the point (2 , 1) , then c = ...

(a) 2 (b) 1 (c) -2 (d) -1

2 [a] Find in $\mathbb{R}$ the solution set of the following equation , using the general rule ; rounding the results to two decimal places : $x(x-1)=4$

[b] **Find :** $n(x)=\frac{x^3-8}{x^2+x-6}\times\frac{x+3}{x^2+2x+4}$ in the simplest form showing the domain.

---

3 **[a] Find in $\mathbb{R}\times\mathbb{R}$ the solution set of the two equations :** $y-x=2$ and $x^2+xy-4=0$

[b] Find n (x) in the simplest form , showing the domain where : $n(x)=\frac{3}{x+1}+\frac{2x+1}{1-x^2}$

---

4 [a] Draw the graphical representation of the function $f(x)=x^2-2x-3$ in the interval $[-2,4]$ and from the drawing , find the solution set of the equation $x^2-2x-3=0$

[b] Find n (x) in the simplest form , showing the domain of n where :

$n(x)=\frac{x^2-2x+1}{x^3-1}\div\frac{x-1}{x^2+x+1}$

---

5 [a] If $n(x)=\frac{x^2-2x}{(x-2)(x^2+2)}$

(1) Find $n^{-1}(x)$ in the simplest form and determine the domain of n^{-1}

(2) If $n^{-1}(x)=3$ what is the value of x ?

[b] If A and B are two events in the sample space of a random experiment and if $P(A)=0.7$, $P(B)=0.6$ and $P(A\cap B)=0.4$

Find : (1) $P(A\cup B)$

(2) Probability occurrence of one event without the other.

7 El-Dakahlia Governorate

Answer the following questions : ***(Calculators are permitted)***

1 **[a] Choose the correct answer from the given answers :**

(1) The point of intersection of the two straight lines : $x+2=0$ and $y=x$ is ....

(a) (2 , 2) (b) (2 , 0) (c) (– 2 , – 2) (d) (0 , 0)

(2) If $n(x)=\frac{x+1}{x-2}$ is an algebraic fraction , then the domain in which the fraction has multiplicative inverse is ....

(a) $\mathbb{R}-\{2\}$ (b) $\mathbb{R}-\{-1,2\}$ (c) $\mathbb{R}-\{-1\}$ (d) $\{-1,2\}$

(3) If there is only one solution for the equation :

$x + 2y = 1$ and $2x + ky = 2$ in $\mathbb{R} \times \mathbb{R}$, then k cannot equal ....

(a) 2 (b) 4 (c) – 2 (d) – 4

[b] Find in $\mathbb{R}$ the solution set of the equation $x(x-3) = -1$, using the general formula (approximating the results to the nearest tenth)

---

2 **[a] Choose the correct answer from the given answers :**

(1) If the curve of the quadratic function f passes through the points $(2, 0)$, $(-3, 0)$ and $(0, -6)$, then the solution set of the equation $f(x) = 0$ in $\mathbb{R}$ is ....

(a) $\{-2, 3\}$ (b) $\{3, 2\}$ (c) $\{2, -3\}$ (d) $\{-3, -6\}$

(2) The simplest form of the function n : $n(x) = \frac{3-x}{x-3}$ such that $x \in \mathbb{R} - \{3\}$ is ....

(a) 1 (b) – 1 (c) 3 (d) – 3

(3) If A is an event of random experiment , then $P(\grave{A}) =$ ....

(a) 1 (b) – 1 (c) $1 - P(A)$ (d) $P(A) - 1$

[b] If $(a, 2b)$ is a solution for the equations $3x - y = 5$ and $x + y = -1$, find the value of a and b

---

3 **[a]** n_1 , n_2 are two algebraic fractions such that : $n_1(x) = \frac{x^2-4}{x^2+x-6}$ and $n_2(x) = \frac{x^2-x-6}{x^2-9}$

Prove that : $n_1(x) = n_2(x)$ for all values of x which belong to the common domain and find this domain.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of pair of equations : $x + y = 3$ and $x^2 + xy = 6$

---

4 **[a]** If $n(x) = \frac{x^2+3x}{x^2+2x-3} - \frac{x-2}{x^2-3x+2}$

Find $n(x)$ in simplest form showing the domain of n

[b] Find $n(x)$ in simplest form showing the domain of n , such that :

$n(x) = \frac{x^3-x^2-2x}{x^2-5x+6} \times \frac{x^2+2x-15}{x^3+6x^2+5x}$, then find n (7) , n (3) if possible.

---

5 **[a]** If $f_1(x) = \frac{x-a}{x+b}$, and the set of zeroes of f_1 is $\{5\}$, and the domain of f_1 is $\mathbb{R} - \{3\}$, then find the values of a and b

If $f_2(x) = \frac{x-1}{x-3}$, then find $f_1(x) + f_2(x)$ in the simplest form.

[b] If A and B are two events in a sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$, **then find :**

(1) $P(A \cup B)$

(2) The probability of occurrence of one of the two events but not the other.

8 Ismailia Governorate

Answer the following questions : ***(Calculators are permitted)***

1 Choose the correct answer from those given answers :

(1) If the age of a man now is X year , then his age after 5 years from now is .... years.

(a) $X - 5$ (b) $5 - X$ (c) $5X$ (d) $X + 5$

(2) The set of zero is of f where $f(X) = X(X^2 - 2X + 1)$ is ....

(a) $\{0, 1\}$ (b) $\{0, -1\}$ (c) $\{-1, 1\}$ (d) $\{0, 1, -1\}$

(3) If $(5, X - 4) = (y, 3)$, then $X + y =$ ....

(a) 25 (b) 12 (c) 8 (d) 6

(4) Number of solutions of the two equations : $X + y = 2$, $y - 3 = 0$ together is ....

(a) 3 (b) 2 (c) 1 (d) zero

(5) If A and B are two mutually exclusive events , then $P(A - B) =$ ....

(a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cup B)$

(6) If the curve of the function f where $f(X) = X^2 - a$ passes through the point $(1, 0)$, then $a =$ ....

(a) -2 (b) -1 (c) zero (d) 1

---

2 [a] Find the solution set of the following equation in $\mathbb{R}$:

$X(X - 2) = 4$ (knowing that : $\sqrt{5} \simeq 2.2$)

[b] If $n(X) = \dfrac{X^2 - 2X}{X^2 - 5X + 6}$

Find : $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

---

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (algebraically) :

$X + y = 5$, $X^2 + Xy = 15$

[b] Find n (X) in the simplest form where : $n(X) = \dfrac{X}{X - 4} - \dfrac{4X + 16}{X^2 - 16}$

4 [a] A classroom consists of 40 students , 30 of them succeeded in math. 24 in science and 20 in both math. and science. If a student is chosen randomly.

Find the probability that this student is :

(1) fail in math.　　　　(2) succeeded in math. or science

[b] Find n (X) in the simplest form showing the domain of n :

$$n(X) = \frac{X^2 - X - 2}{X^2 - 1} \div \frac{X - 5}{X^2 - 6X + 5}$$

---

5 **[a] Find n (X) in the simplest form where :** $n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} + \frac{1}{X + 2}$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (graphically) :

$y = 3X - 1$, $X - y + 1 = \text{zero}$

9 Suez Governorate

Answer the following questions : (Calculators are permitted)

1 **Choose the correct answer from those given :**

(1) The set of zeroes of f where $f(X) = (X - 1)^2 (X + 2)$ is ....

(a) $\{1 , -2\}$　　(b) $\{-1 , 2\}$　　(c) $\{-1 , -2\}$　　(d) $\{1 , 2\}$

(2) If $X - y = 2$, $X^2 - y^2 = 10$, then $X + y =$ ....

(a) -5　　(b) 2　　(c) -2　　(d) 5

(3) If $A \subset S$ of a random experiment , $P(A) = P(\acute{A})$, then $P(A) =$ ....

(a) zero　　(b) 1　　(c) $\frac{1}{2}$　　(d) $\frac{1}{4}$

(4) If X is a negative number , then the greatest number is ....

(a) $3 + X$　　(b) $3 - X$　　(c) $3X$　　(d) $\frac{3}{X}$

(5) If $X = 3$ belongs to the solution set of the equation : $X^2 - aX - 6 = 0$, then a = ...

(a) 3　　(b) 2　　(c) 1　　(d) -1

(6) The function f where $f(X) = \frac{X - 3}{X - 4}$ has additive inverse in the domain ....

(a) $\mathbb{R} - \{3\}$　　(b) $\mathbb{R} - \{4\}$　　(c) $\mathbb{R} - \{-4\}$　　(d) $\mathbb{R} - \{-3\}$

2 **[a] Find the solution set in $\mathbb{R} \times \mathbb{R}$:** $2x - y = 7$, $3x + y = 8$

(Explain your answer showing the steps solution)

[b] Find n (x) in the simplest form showing the domain of n where :

$n(x) = \frac{x}{x+1} + \frac{x^2}{x^3 + x^2}$, then calculate n (3)

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :**

$x - 1 = 0$, $x^2 + y^2 = 10$

[b] If the fraction $\frac{x+2}{x^2-4}$ is the multiplicative inverse of $\frac{x \quad 2}{h}$ where $x \notin \{2 , -2\}$,

then calculate h

---

4 **[a] Find in $\mathbb{R}$ the solution set for the following equations by using the formula in :**

$x^2 - 3x + 1 = 0$, knowing that $\sqrt{5} = 2.24$

[b] If $n_1(x) = \frac{3x}{3x+3}$, $n_2(x) = \frac{x^2 + x}{x^2 + 2x + 1}$ **Prove that :** $n_1 = n_2$

---

5 **[a] Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \frac{x^2 + 2x + 1}{2x - 8} - \frac{x - 4}{x + 1}$

[b] If A and B are two events from the sample of a random experiment and

$P(A) = 0.6$, $P(B) = 0.3$, $P(A \cap B) = 0.5$

Find : (1) $P(A \cup B)$ (2) $P(\grave{B})$

10 Port Said Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

(1) If the two equations : $x + 3y = 4$, $x + ay = 7$ represent two parallel straight lines , then a = ...

(a) $-\frac{1}{3}$ (b) -3 (c) 3 (d) 1

(2) The domain of the multiplicative inverse of the fraction : $\frac{x-2}{x^3 + 27}$ is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-3 , 2\}$ (c) $\mathbb{R} - \{2 , -3 , 3\}$ (d) $\mathbb{R} - \{3 , -3\}$

(3) If $x^2 - y^2 = 2(x + y)$ such that : $x + y \neq 0$, then $x - y = \dots\dots\dots$

(a) 2 (b) 4 (c) 6 (d) 8

(4) If a die is tossed once , then the probability of appearance of an odd number equals ....

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 1 (d) 3

(5) The degree of the equation : $3x + 4y + xy = 5$ is ....

(a) zero. (b) first. (c) second. (d) third.

(6) If $2x = 1$, then $\frac{1}{5}x = \dots\dots\dots$

(a) $\frac{2}{5}$ (b) $\frac{1}{5}$ (c) $\frac{1}{2}$ (d) $\frac{1}{10}$

---

2 **[a] Solve in $\mathbb{R}$ the equation :** $2x(x - 5) = 1$ approximate to the nearest one decimal.

[b] Find the common domain of $n_1(x)$, $n_2(x)$ to be equal such that :

$$n_1(x) = \frac{x^2 + 9x + 20}{x^2 - 16} \quad , \quad n_2(x) = \frac{x^2 + 5x}{x^2 - 4x}$$

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$$x - 2y = 0 \quad , \quad x^2 - y^2 = 3$$

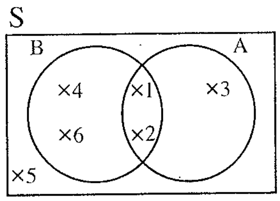
[b] If $n(x) = \frac{x + 3}{x^2 + 5x - 14} \div \frac{x^2 + 3x}{2x + 14}$

Find : $n(x)$ in its simplest form , showing the domain of n

---

4 **[a] Find n in its simplest form , showing its domain where :** $n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$

[b] Use the opposite Venn diagram to calculate the probability of :



(1) Non occurrence of the event A

(2) The occurrence of the event B only.

(3) Occurrence of A or B

---

5 **[a]** If $n(x) = \frac{x^2 - 2x}{(x - 2)(x + 2)}$

(1) **Find :** $n^{-1}(x)$ (2) If $n^{-1}(x) = 3$ what is the value of x ?

[b] Two number , if three times a number is added to twice a second number the sum is 13 and if the first number is added to three times the second number the sum is 16 , find the two number.

11 Damietta Governorate

Answer the following questions : ***(Calculators are permitted)***

1 Choose the correct answer from the given ones :

(1) The solution set of the equation : $a X^2 + b X + c = 0$, $a \neq 0$ graphically is the set of X coordinates of the points of intersection of the curve of the function $f : f(X) = a X^2 + b X + c$ with the ....

(a) y-axis (b) X-axis (c) symmetric line (d) straight line y = 2

(2) If $a b = 12$, $b c = 20$, $a c = 15$, $a \in \mathbb{R}^+$, $b \in \mathbb{R}^+$, $c \in \mathbb{R}^+$, then $a b c =$ ....

(a) 360 (b) 3600 (c) 60 (d) 36

(3) If the algebraic fraction $\frac{X - a}{X + 5}$ have a multiplicative inverse which is $\frac{X + 5}{X + 3}$, then a = ...

(a) 3 (b) – 5 (c) – 3 (d) 5

(4) $\sqrt{(-2)^4 + 3^2} =$ .... + 3

(a) 2^2 (b) 2 (c) – 2 (d) $(-2)^2$

(5) If $P(A) = P(\grave{A})$, then $P(A) =$ ....

(a) $\frac{1}{2}$ (b) 1 (c) $\frac{3}{4}$ (d) 0

(6) $X^3 - 1 =$ ....

(a) $(X^2 - 1)(X + 1)$ (b) $(X - 1)(X^2 + 2X + 1)$

(c) $(X - 1)(X^2 + X + 1)$ (d) $(X - 1)(X^2 - 2X - 1)$

---

2 [a] Find : $n(X) = \frac{X - 3}{X^2 - 7X + 12} - \frac{4}{X^2 - 4X}$ in the simplest from showing the domain of n

[b] Find the value of a and b , knowing that : $\{(3 , -1)\}$ is the solution set of the two equations : $a X + b y - 5 = 0$, $3 a X + b y = 17$

---

3 [a] Find in $\mathbb{R}$ the solution set for the equation $X(X - 1) = 4$ using the general rule to the nearest hundredth.

[b] Find the common domain of f_1 , f_2 to be equal such that :

$f_1(X) = \frac{X^2 + X - 12}{X^2 + 5X + 4}$, $f_2(X) = \frac{X^2 - 2X - 3}{X^2 + 2X + 1}$

4 **[a]** Two acute angles in a right-angled triangle the difference between their measures is 50°
Find the measure of each angle.

[b] Find n (X) in the simplest form showing the domain :

$$n(X) = \frac{X^2 - 3X + 2}{X^2 - 1} \div \frac{3X - 15}{X^2 - 4X - 5}$$

---

5 **[a]** If A and B are two events from a sample space of a random experiment and

$P(A) = 0.4$, $P(B) = 0.5$, $P(A \cup B) = 0.7$

Find : (1) $P(A \cap B)$ (2) $P(B - A)$

[b] If $n(X) = \dfrac{X + \frac{1}{X}}{4X + \frac{4}{X}}$ Find n (X) in the simplest form showing the domain.

12 Kafr El-Sheikh Governorate

Answer the following questions : (Calculator is allowed)

1 **[a] Choose the correct answer from those given :**

(1) If $X = y + 1$, $(X - y)^2 + y = 3$, then y = ...

(a) zero (b) 1 (c) 2 (d) 3

(2) If a b = 3 , $a b^2 = 12$, then b = ...

(a) 4 (b) 2 (c) – 2 (d) ± 2

(3) If $n(X) = \dfrac{X - 1}{X - 2}$, then the domain of n^{-1} = ...

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{2\}$ (d) $\mathbb{R} - \{1, 2\}$

[b] Solve in $\mathbb{R} \times \mathbb{R}$ the two simultaneous equations :

$X - y = 1$, $X^2 + y^2 = 25$

---

2 **[a] Choose the correct answer from those given :**

(1) The probability of the impossible event equals ....

(a) $\varnothing$ (b) zero (c) 1 (d) – 1

(2) If the solution set of the equation : $X^2 + mX + 9 = 0$ is $\{-3\}$, then m = ...

(a) 5 (b) 6 (c) ± 6 (d) zero

(3) If the two equations : $X + 3y = 6$, $2X + ky = 12$ have an infinite number of solution in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 2 (b) 6 (c) 3 (d) 1

[b] Two acute angles in a right-angled triangle the difference between their measures is 50°
Find the measure of each angle.

---

3 [a] **Solve in $\mathbb{R}$ using the (general rule) the equation :** $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] **Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{3}{x+1} + \frac{2x+1}{1-x^2}$$

---

4 [a] If A , B are two events from a sample space of random experiment , and
$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$, **then find P (A) if :**

(1) A and B are two mutually exclusive events. (2) $B \subset A$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ **Prove that :** $n_1 = n_2$

---

5 [a] If $n(x) = \frac{x^2 - 5x}{(x-5)(x^2+1)}$

(1) Find $n^{-1}(x)$ and identify the domain of n^{-1}

(2) If $n^{-1}(x) = 2$, find the value of x

[b] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$

Find n (x) in the simplest form showing the domain of n

13 El-Beheira Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from the given ones :**

(1) If $f(x) = 2x$, then $f(1) - f(-1) =$ ....

(a) zero (b) 4 (c) 2 (d) – 2

(2) The two straight lines : $x + 5y = 1$, $x + 5y - 8 = 0$ are ....

(a) parallel. (b) coincide.

(c) intersect and non perpendicular. (d) perpendicular.

(3) If $n(X^2) = 9$, then n (X) = ...

(a) 81 (b) 3 (c) ± 3 (d) – 3

(4) If $n(X) = \frac{X-2}{X^2 - X - 6}$, then the domain of n^{-1} is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-2, 3\}$ (c) $\mathbb{R} - \{-2, 2\}$ (d) $\mathbb{R} - \{-2, 2, 3\}$

(5) The degree of the equation : $3X + 4y + Xy = 5$ is ....

(a) zero. (b) first. (c) second. (d) third.

(6) A card is drawn randomly from 20 identical cards numbered from 1 to 20 , then the probability that the number of the drawn card multiple of 7 is ....

(a) 10 % (b) 15 % (c) 20 % (d) 25 %

---

2 **[a] Solve in $\mathbb{R}$ the equation :** $3X^2 = 5X + 4$ approximating the result to the nearest two decimals.

[b] Simplify the function n (X) where :

$n(X) = \frac{3X}{X^2 - 2X} - \frac{12}{X^2 - 4}$ showing the domain of n

---

3 **[a]** If $f(X) = \frac{X^2 - 9}{X + b}$, $f(4) = 1$ **Find :** b

[b] If A and B are two events in a random experiment

, P (A) = 0.7 , P (B) = 0.6 and P (A ∩ B) = 0.4

Find the probability of :

(1) Non occurrence of the event A

(2) Occurrence of one of the events but not the other.

---

4 **[a]** The sum of two rational numbers is 12 , and three times the smallest number exceeds than twice the greatest number by one Find the two numbers.

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$ **, then prove that :** $n_1 = n_2$

---

5 **[a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations :** $X - y = 1$, $X^2 + y^2 = 25$

[b] If $f(X) = \frac{X^2 - 49}{X^3 - 8} \div \frac{X + 7}{X - 2}$

Find : $f(X)$ in its simplest form showing the domain of f

14 El-Fayoum Governorate

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer from the given ones :

(1) $\left(2\sqrt{2}\right)^4 = $ ....

(a) 8 (b) 16 (c) 32 (d) 64

(2) If A and B are mutually exclusive events from the sample space of a random experiment , then P $(A \cap B) = $ ....

(a) 1 (b) zero (c) $\frac{1}{2}$ (d) -1

(3) If $X = 1$ is the solution of the equation : $X^2 + mX + 4 = 0$, then m = ...

(a) 1 (b) -1 (c) zero (d) -5

(4) If $2X^2 = 5$, then $6X^2 = $ ....

(a) 5 (b) 10 (c) 15 (d) 20

(5) If $n(X) = \frac{X}{X-1}$, then the domain of $n^{-1} = $ ....

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

(6) The sum of two consecutive integers is 17 , then the smaller number of them is ....

(a) 8 (b) 9 (c) 17 (d) 72

---

2 [a] If $n(X) = \frac{X^2 + X}{X^2 - X - 2} - \frac{2X + 4}{X^2 - 4}$, find n (X) in the simplest form showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$y = X + 1$, $X^2 + y^2 = 13$

---

3 [a] By using the general rule find in $\mathbb{R}$ the solution set of the equation :

$X^2 - 5X + 3 = 0$, approximating the result to the nearest one decimal digit.

[b] Find n (X) in the simplest form showing the domain of n where :

$$n(X) = \frac{X^3 - 1}{X^2 - 2X + 1} \div \frac{X^2 + X + 1}{2X - 2}$$

---

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$y = X + 1$, $2X + y = 7$

[b] Find the set of zeroes of the function f : $f(X) = \frac{X - 1}{X + 1}$, then find $f^{-1}(2)$

5 **[a] Find the common domain of n_1 and n_2 to be equal such that :**

$$n_1(X) = \frac{X^2 + 2X}{X^2 + 3X + 2} \quad , \quad n_2(X) = \frac{X^2 - X}{X^2 - 1}$$

[b] A bag contains 10 identical cards numbered from 1 to 10 , one card of them is drawn randomly , calculate the probability that the number on the drawn card is :

(1) A prime number. (2) A number divisible by 5

15 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

(1) The probability of the impossible event equals ....

(a) $\varnothing$ (b) 1 (c) zero (d) – 1

(2) If $2^X = 8$, then $X =$ ....

(a) zero (b) 1 (c) 2 (d) 3

(3) If the two straight lines which represent the two equations :

$X + 2y = 4$, $2X + ky = 11$ are parallel , then k = ...

(a) 4 (b) 1 (c) – 1 (d) – 4

(4) If a is a negative number , then the greatest number is ....

(a) 3 + a (b) 3 – a (c) 3 a (d) $\frac{3}{a}$

(5) The solution set of the equation : $X^2 + 1 = 0$ in $\mathbb{R}$ is ....

(a) $\{1\}$ (b) $\{1 , -1\}$ (c) $\{-1\}$ (d) $\varnothing$

(6) If $n(X) = \frac{X - 1}{X + 2}$, then $n^{-1}(1)$ is ....

(a) – 1 (b) zero (c) 3 (d) undefined.

---

2 **[a] Find the set of zeroes of the function $f : f(X) = X^3 - X$**

[b] Find in $\mathbb{R}$ the solution set of the following equation by using the general formula :

$X^2 - 5X + 3 = 0$ approximating the result to the nearest one decimal digit.

---

3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X + y = 4$, $2X - y = 2$

[b] If A and B are two events from a sample space of a random experiment , P (A) = 0.6 , P (B) = 0.5 and P (A ∩ B) = 0.3

Find : (1) P (A – B) (2) P (A ∪ B)

4 [a] If $n_1(x) = \frac{x^2 - 2x + 4}{x^3 + 8}$, $n_2(x) = \frac{3}{3x + 6}$

Prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$x - 2 = 0$, $x^2 + xy + y^2 = 7$

---

5 [a] Find $n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$

in the simplest form showing the domain of n

[b] If the domain of the function n : $n(x) = \frac{x - 1}{x^2 - ax + 9}$ is $\mathbb{R} - \{3\}$

, then find the value of a

16 El-Menia Governorate

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer from those given :

(1) $(-1)^{37} - (-1)^{36} =$ ....

(a) -2 (b) zero (c) 1 (d) 2

(2) The degree of the function $f : f(x) = 2x^3 + 3x^2 - 5$ is ....

(a) frouth. (b) fifth. (c) third. (d) zero.

(3) If $a + b = 7$, $a^2 - b^2 = 21$, then $a - b =$ ....

(a) -7 (b) 7 (c) -3 (d) 3

(4) The simplest form of the function $f : f(x) = \frac{3 - x}{x - 3}$ where $x \neq 3$ is ....

(a) 3 (b) 1 (c) -1 (d) zero

(5) The number of solutions of the two equations :

$x - \frac{1}{2}y = 4$, $2x - y = 1$ in $\mathbb{R}^2$ is ....

(a) one solution . (b) two solutions.

(c) an infinite number. (d) zero.

(6) If a die is tossed once , then the probability of appearance of a number greater than 4 is ....

(a) $\frac{2}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of :**

$x + y = \text{zero}$, $5y^2 - 4x^2 = 36$

[b] Find n (X) in the simplest form and determine the domain of n :

$$n(X) = \frac{X-3}{X^2-7X+12} - \frac{4}{X^2-4X}$$

---

3 **[a] By using the general formula find in $\mathbb{R}$ the S.S. of :** $X^2 - X - 4 = 0$ where $\sqrt{17} \approx 4.12$

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2+2X}{X^2+4X+4}$ **Prove that :** $n_1 = n_2$

---

4 **[a] Find n (X) in the simplest form showing the domain of n :** $n(X) = \frac{X^2+2X+1}{2X-8} \times \frac{X-4}{X+1}$

[b] If $(-3 , 1)$ is a solution for the two equations $aX + by = 5$, $3aX + by - 17 = 0$
Find : a , b

---

5 **[a]** If the domain of n : $n(X) = \frac{\ell}{X} + \frac{9}{X+m}$ is $\mathbb{R} - \{0 , -2\}$, n (4) = 1 **Find :** ℓ , m

[b] If S is the sample space of a random experiment where its outcomes are equal , A and B are two events from S , if the number of outcomes that leads to the occurrence of the event A = 13 and the number of all possible outcomes of the random experiment is 24 , $P(A \cup B) = \frac{5}{6}$ and $P(B) = \frac{5}{12}$

Find :

(1) The probability of occurrence of the event A

(2) The probability of occurrence of the events A and B together.

17 Assiut Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer :**

(1) The solution set of the two equations : $X = -1$, $y - 1 = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(-1 , 1)\}$ (b) $\{(1 , -1)\}$ (c) $\{(-1 , -1)\}$ (d) $\{(1 , 1)\}$

(2) The solution set of the equation : $2X + 4 = 0$ in $\mathbb{N}$ is ....

(a) $\{2\}$ (b) $\{-2\}$ (c) $\{0\}$ (d) $\varnothing$

(3) The domain of the function f where $f(X) = \frac{X-2}{X^2+1}$ is ....

(a) $\mathbb{R} - \{-1\}$ (b) $\mathbb{R} - \{1 , -1\}$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R}$

(4) If $A \subset S$, $P(A) = \frac{1}{3}$, then $P(\acute{A}) =$ ....

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{2}$

(5) $|-5| =$ ....

(a) -5 (b) $-\frac{1}{5}$ (c) 5 (d) $\frac{1}{2}$

(6) If A and B are two mutually exclusive events of a random experiment ,
then P (A ∩ B) = ...

(a) ∅ (b) 1 (c) zero (d) $\frac{1}{2}$

2 **[a] Find algabrically the solution set of the two equations :**

$2X - y = 3$, $X + 2y = 4$

[b] Find n (X) in the simplest form showing the domain of n where :

$$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} + \frac{X^2 + X - 2}{X^2 - 4}$$

3 **[a] Find in ℝ × ℝ the solution set of the two equations :**

$X - y = 1$, $X^2 + y^2 = 25$

[b] If $n(X) = \frac{X^2 - 3X + 2}{X^2 - 1} \div \frac{3X - 15}{X^2 - 4X - 5}$

, find n (X) in the simplest form showing the domain of n

4 **[a] Find in ℝ the solution set of the equation :** $3X^2 - 5X - 1 = 0$
approximating the result to the nearest two decimals.

[b] If $n(X) = \frac{X^2 + 3X}{X^3 + 27}$, find $n^{-1}(X)$ in its simplest form showing the domain of n^{-1}

5 **[a]** If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$ **Prove that :** $n_1 = n_2$

[b] A bag contains 15 identical balls numbered from 1 to 15 , one ball is chosen randomly , if the event A is getting an odd number and the event B is getting a number divisible by 5

Find :

(1) P (A) (2) P (B) (3) P (A – B)

18 Souhag Governorate

Answer the following questions : (Calculator is allowed)

1 **Choose the correct answer :**

(1) The set of zeroes of the function f where $f(X) = \frac{X - 3}{X + 2}$ is ....

(a) {zero} (b) {3} (c) {– 2} (d) {3 , – 2}

(2) If $2^n = 3$, then 8^n = ...

(a) 27 (b) 9 (c) 3 (d) 6

(3) If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \ldots\ldots$

(a) $\varnothing$ (b) 1 (c) 2 (d) zero

(4) If $3^{X} + 3^{X} + 3^{X} = 9$, then $X = \ldots\ldots$

(a) 4 (b) 2 (c) 1 (d) 9

(5) If the two equations : $X + 3y = 6$, $2X + ky = 12$ have an infinit number of solutions , then $k = \ldots\ldots$

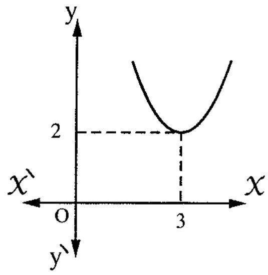
(a) 1 (b) 6 (c) 3 (d) 2

(6) **In the opposite figure :**

The solution set of $f : f(X) = 0$ is ....

(a) $\varnothing$ (b) $\{3\}$

(c) $\{2, 3\}$ (d) $\{2\}$



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2 **[a] Solve in $\mathbb{R}$ the equation :** $2X^2 - 5X + 1 = 0$ approximating the result to the nearest two decimals.

[b] If $n_1(X) = \dfrac{X^2}{X^3 - X^2}$, $n_2(X) = \dfrac{X^3 + X^2 + X}{X^4 - X}$, **prove that :** $n_1 = n_2$

---

3 **[a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations :** $X - 2y = 1$, $X^2 - Xy = 0$

[b] Find n (X) in the simplest form showing the domain of n where : $n(X) = \dfrac{X}{X+1} + \dfrac{2X^2}{X^3 - X}$

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2X + y = 1$, $X + 2y = 5$

[b] If $n(X) = \dfrac{X^2 - 3X}{X^2 - 9} \div \dfrac{2X}{X + 3}$, find n (X) in its simplest form showing the domain of n

---

5 **[a]** If $n(X) = \dfrac{X - 2}{X + 1}$,

Find : (1) $n^{-1}(X)$ showing the domain of n^{-1} (2) $n^{-1}(3)$

[b] If A and B are two events in a random experiment , $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

19 Qena Governorate

محافظة قنا

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer :

(1) If there are infinite numbers of solutions of the two equations

$x + 4y = 7$, $3x + ky = 21$, then k = ...

(a) 4 (b) 7 (c) 12 (d) 21

(2) One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ is ....

(a) (– 4 , 2) (b) (2 , – 4) (c) (3 , 1) (d) (4 , 2)

(3) The set of zeroes of f where $f(x) = x^2 - 2$ is ....

(a) $\{2\}$ (b) $\{-2\}$ (c) $\{\sqrt{2}, -\sqrt{2}\}$ (d) $\varnothing$

(4) The simplest form of $f(x) = \frac{4x^2 - 2x}{2x}$, $x \neq 0$ is ....

(a) $4x^2$ (b) $2x - 1$ (c) $2x$ (d) 2

(5) If A and B are two mutually exclusive events, then P (A ∩ B) = ...

(a) $\varnothing$ (b) zero (c) 0.56 (d) 1

(6) If A ⊂ B , then P (A ∪ B) = ...

(a) zero (b) P (A) (c) P (B) (d) P (A ∩ B)

---

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :**

$2x - y = 3$, $x + 2y = 4$

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$ **Prove that :** $n_1 = n_2$

---

3 **[a] Find in $\mathbb{R}$ the solution set of the following equation by using the general rule :**

$3x^2 = 5x - 1$ (Rounding the results to two decimal places)

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 + x + 1}{x} \times \frac{x^2 - x}{x^3 - 1}$$

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :**

$x + y = 7$, $xy = 12$

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{3x - 4}{x^2 - 5x + 6} + \frac{2x + 6}{x^2 + x - 6}$$

5 **[a]** If $n(x) = \dfrac{x^2 - 2x}{(x-2)(x^2+2)}$

(1) Find $n^{-1}(x)$ and identify the domain.

(2) If $n^{-1}(x) = 3$ what is the value of x ?

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.7$, $P(A \cap B) = 0.3$ **Find :** $P(A - B)$

20 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

(1) The set of zeroes of the function $f : f(x) = x^2 + 3$ is ....

(a) $\{0\}$ (b) $\varnothing$ (c) $\{3\}$ (d) $\{3 , -3\}$

(2) $\sqrt{16 + 9} = 4 +$ ....

(a) 3 (b) 5 (c) 1 (d) 7

(3) If $\grave{A}$ is the complement event of the event A in a sample space of a random experiment , then $P(A) + P(\grave{A}) =$ ....

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) 3

(4) If $3^x = 1$, then $x =$ ....

(a) 0 (b) $\frac{1}{3}$ (c) 1 (d) 3

(5) The point of intersection of the two straight lines : $y = 2$, $x + y = 6$ is ....

(a) (2 , 4) (b) (2 , 6) (c) (6 , 2) (d) (4 , 2)

(6) If $(5 , x - 4) = (y + 2 , 3)$, then $x + y =$ ....

(a) 6 (b) 8 (c) 10 (d) 12

---

2 **[a] Find the solution set of the two equations in $\mathbb{R}^2$:** $x - 2y = 0$, $x^2 - y^2 = 3$

[b] If $n(x) = \dfrac{x^2 - 16}{x + 4}$

Find : (1) $n^{-1}(x)$ showing the domain of n^{-1} (2) $n^{-1}(4)$ (3) $n(4)$

---

3 **[a]** If $n_1(x) = \dfrac{2x}{2x + 4}$, $n_2(x) = \dfrac{x^2 + 2x}{x^2 + 4x + 4}$ **Prove that :** $n_1 = n_2$

[b] Using the general rule find in $\mathbb{R}$ the S.S. of the equation :

$3x^2 = 5x - 1$ (given that $\sqrt{13} \approx 3.61$)

4 [a] If A , B are two events of the sample space of a random experiment and if

$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$

Find P (A) in the following cases :

(1) A and B are two mutually exclusive events (2) $B \subset A$

[b] If $n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{5 - X}{X^2 - 6X + 5}$

Find n (X) in the simplest form showing the domain of n.

---

5 [a] If $n(X) = \frac{X^3 - 1}{X^2 - 2X + 1} \times \frac{2X - 2}{X^2 + X + 1}$

Find n (X) in the simplest form showing the domain

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :**

$y = X + 4$, $X + y = 4$

21 Aswan Governorate

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer from those given :

(1) If $X + y = 5$, then $3X + 3y =$ ....

(a) 5 (b) 3 (c) 8 (d) 15

(2) If $\sqrt{64 + 36} = 8 + X$, then $X =$ ....

(a) 9 (b) 6 (c) 2 (d) 10

(3) The solution set of the two equations : $y - 5 = 0$, $y + X = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(-5, 5)\}$ (b) $(5, -5)$ (c) $\{(0, 5)\}$ (d) $(-5, 5)$

(4) The set of zeroes of the function $f : f(X) = 4$ is ....

(a) $\{-4\}$ (b) $\{zero\}$ (c) $\varnothing$ (d) $\{2\}$

(5) If the probability that a student succeeded is 95 % , then the probability that he does not succeed is ....

(a) 20 % (b) 5 % (c) 10 % (d) zero

(6) The solution set of the equation : $X^2 - 4X + 4 = 0$ in $\mathbb{R}$ is ....

(a) $\{-2\}$ (b) $\{2\}$ (c) $\{4, 1\}$ (d) $\varnothing$

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of two equations :**

$X + y = 4$, $2X - y = 2$

[b] If $n(X) = \frac{X - 1}{X + 3}$ find $n^{-1}(X)$ and identify the domain of n^{-1}

3 **[a]** If $n(X) = \frac{X^2 - 3X}{X^2 - 9} \div \frac{2X}{X + 3}$, **find n (X) in the simplest form showing the domain of n**

[b] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$X - 2y = 0$, $X^2 - y^2 = 3$

---

4 **[a]** If A and B are two events from a sample space of a random experiment and

$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$

Find P (A ∪ B) if :

(1) $P(A \cap B) = \frac{1}{8}$

(2) A and B are mutually exclusive events.

[b] If $n(X) = \frac{X}{X^2 + 2X} + \frac{X - 2}{X^2 - 4}$, **find n (X) in the simplest form showing the domain of n**

---

5 **[a] By using the formula find in $\mathbb{R}$ the solution set of the equation**

$3X^2 - 5X + 1 = 0$ rounding the result to two decimal places.

[b] Find the common domain in which the two functions n_1 and n_2 are equal where :

$n_1(X) = \frac{X^2 + X - 12}{X^2 + 5X + 4}$, $n_2(X) = \frac{X^2 - 2X - 3}{X^2 + 2X + 1}$

22 South Sinai Governorate

Answer the following questions : (Calculator is permitted)

1 **Choose the correct answer from those given :**

(1) The number of solutions of the two equations : $X + y = 5$ and $y - 5 = 0$ is ....

(a) zero (b) 1 (c) 2 (d) 3

(2) The point (– 3 , 4) lies in .... quadrant.

(a) fourth (b) third (c) second (d) first

(3) The range of the set of the values : 7 , 3 , 6 , 9 and 5 equals ....

(a) 3 (b) 4 (c) 5 (d) 6

(4) $(-3X) \times (-5y) =$ ....

(a) $15Xy$ (b) $8Xy$ (c) $-8Xy$ (d) $-15Xy$

(5) If the fraction $\frac{X - a}{X + 3}$ is the multiplicative inverse of $\frac{X + 3}{X + 5}$, then a = ...

(a) – 5 (b) – 3 (c) 3 (d) 5

(6) If A and B are two mutually exclusive events, then P (A ⋂ B) equals ....

(a) ∅ (b) zero (c) $\frac{1}{2}$ (d) 1

2 Find n (X) in the simplest form showing the domain of n where :

(1) $n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{X - 5}{X^2 - 6X + 5}$

(2) $n(X) = \frac{X^2 + 2X}{X^3 - 27} \times \frac{X^2 + 3X + 9}{X + 2}$

3 [a] Find in ℝ × ℝ the solution set of the following two equations graphically :

$y = X + 4$, $y + X = 4$

[b] By using the formula find in ℝ the solution set of the equation : $2X^2 - 5X - 1 = 0$ approximating the result to the nearest one decimal.

4 [a] Find in ℝ × ℝ the solution set of the following two equations :

$X - y = 1$, $X^2 - Xy = 0$

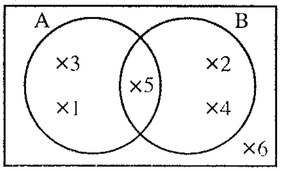
[b] Use the opposite Venn diagram and find :

(1) P (A ⋂ B)

(2) P (A ⋃ B)

(3) P (A – B)

S



5 [a] If the domain of the function n where $n(X) = \frac{b}{X} + \frac{9}{X + a}$ is ℝ – {0 , 3} , n (6) = 7 find the values of a , b

[b] If $n_1(X) = \frac{1}{X + 1}$, $n_2(X) = \frac{X^2 - X + 1}{X^3 + 1}$ **, then prove that :** $n_1 = n_2$

23 North Sinai Governorate

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer from those given :

(1) The multiplicative inverse of $\frac{\sqrt{2}}{3}$ is ....

(a) $\frac{-\sqrt{2}}{3}$ (b) $\frac{3\sqrt{2}}{2}$ (c) $\frac{2\sqrt{3}}{3}$ (d) $\frac{\sqrt{3}}{2}$

(2) The S.S. of the two equations : $X - 2y = 1$, $3X + y = 10$ in ℝ × ℝ is ....

(a) {(5 , 2)} (b) {(2 , 4)} (c) {(1 , 3)} (d) {(3 , 1)}

(3) Twice its square the number $\frac{1}{2}$ is ....

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 1

(4) The domain of the function $f : f(X) = \frac{X-2}{7}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{7\}$ (d) $\mathbb{R} - \{2, 7\}$

(5) $X^2 + kX + 9$ is a perfect square if k = ...

(a) 3 (b) -3 (c) ± 3 (d) ± 6

(6) If the probability of failure of a student is 0.4, then the probability of his success is ....

(a) zero (b) 1 (c) $\frac{2}{5}$ (d) $\frac{3}{5}$

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2 **[a] Using the general formula, find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 2X - 6 = 0$

[b] Find n (X) in the simplest form showing the domain of n where :

$n(X) = \frac{X}{X-4} - \frac{X+4}{X^2-16}$

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3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the following two equations :**

$X - y = 2$, $X^2 - 5y = 4$

[b] If $n(X) = \frac{X^2 + 3X}{X^2 + X - 6}$

(1) **Find :** $n^{-1}(X)$ and find the domain of n^{-1} (2) If $n^{-1}(X) = 2$, find value of X

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4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S of the following two equations graphically :**

$y = 2X - 3$, $X + 2y = 4$

[b] Find n (X) in the simplest form showing the domain of n where :

$n(X) = \frac{X^3 - 8}{X^2 - 6X + 5} \div \frac{X^3 + 2X^2 + 4X}{2X^2 + X - 3}$

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5 **[a]** A bag contains 15 balls numbered from 1 to 15, if a ball is drawn randomly, if the event A is getting an odd number and the event B is getting a prime number

Find : (1) P (A) (2) P (B) (3) P (A – B)

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$

Prove that : $n_1 = n_2$

24 Matrouh Governorate

Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

(1) $3^{-2} =$ ....

(a) -9 (b) $\frac{-1}{9}$ (c) $\frac{1}{9}$ (d) 9

(2) If A and B are two mutually exclusive events in a random experiment , then $P(A \cap B) =$ ....

(a) zero (b) $\varnothing$ (c) 1 (d) $\{0 , 1\}$

(3) The solution set of the inequality : $X \leq 1$ in $\mathbb{N}$ is ....

(a) $\{1\}$ (b) $\{0\}$ (c) $\{0 , 1\}$ (d) $\{0 , 1 , -1 , ...\}$

(4) The set of zeroes of f where $f(X) = \frac{X^2 - 9}{X - 2}$ is ....

(a) $\{2\}$ (b) $\mathbb{R} - \{2\}$ (c) $\{3 , -3\}$ (d) $\{3 , -3 , 2\}$

(5) If $n(X) = \frac{X - 7}{X + 3}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-3 , 7\}$ (d) $\mathbb{R} - \{7\}$

(6) The point of intersection of the two straight lines : $y = 2$ and $X + y = 6$ is ....

(a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

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2 [a] Find the common domain in which the two functions f_1 and f_2 are equal where :

$$f_1(X) = \frac{X^2 + 3X + 2}{X^2 - 4} \quad , \quad f_2(X) = \frac{X^2 - 1}{X^2 - 3X + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set to the following two equations graphically :

$y = X + 4$, $X + y = 4$

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3 [a] Find $f(X)$ in the simplest form , showing the domain of f where :

$$f(X) = \frac{X^2 - X}{X^2 - 1} + \frac{X + 5}{X^2 + 6X + 5}$$

[b] Find in $\mathbb{R}$ the solution set of the equation : $X^2 - 2X - 6 = 0$

approximating the result to the nearest two decimals.

4 **[a] Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 5}{x^2 - 4x - 5}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$y = x - 3$, $x^2 + y^2 = 17$

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5 **[a] If the set of zeros of the function f where :**

$f(x) = a x^2 + b x + 8$ is $\{2, 4\}$ **Find the value of a and b**

[b] If A and B are two events in a random experiment

, P (A) = 0.8 , P (B) = 0.7 and P (A $\cap$ B) = 0.6

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence of at least one of the events.